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Results from
Inhalable Particulate Matter (PM₁₀)
Sampling Network (1984 - 1987)

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Analyses of TSP, SSI and dichotomous sampler filters were carried out by Dr. Joe Dlouhy, Nicole Houle, Scott Ritchie and Alan Klein of Chemistry Division, Ottawa.

1. INTRODUCTION

In anticipation of a future revision to the total suspended particulate matter ambient air quality objective for Canada, Environment Canada, in conjunction with provincial and municipal operating agencies, established in June 1981 an inhalable particulate matter monitoring program. Three years of data were gathered at seven urban sites using 15 μm inlet dichotomous samplers; reports summarizing the results of this sampling effort have previously been published.^{1,2} In May 1984, the original samplers were converted using 10 μm cutpoint inlets and additional samplers were added to the network. A report summarizing mass, lead, sulphate, nitrate and bromine data collected up to March 1985 was distributed in 1986.³ This report contains all mass, sulphate and nitrate data for the period May 1984 to December 1987 and data for 40 other elements associated with particulate matter for the period November 1985 to December 1987.

The particulate matter samplers used in this study were designed to have a 50% cutpoint (D_{50}) of 10 μm particle aerodynamic diameter. D_{50} is defined as the particle size at which the sampler collects 50% of the sample and rejects 50%. Particles whose aerodynamic diameters are below the D_{50} of 10 μm are collected at progressively greater than 50% efficiency while those particles larger than D_{50} are collected with progressively less efficiency. Thus, 10 μm particulate samples do contain particles larger than 10 μm . This is consistent, however, with the physiology of the human respiratory system where a large percentage, but not all, of particles larger than 10 μm are trapped in the oral/nasal passage and prevented from entering the lung.^{4,5} The mass of particulate collected with a sampler with a 10 μm inlet is referred to as PM_{10} . An alternative name for this particulate mass fraction is inhalable particulate (IP).

2. SAMPLING SITES and SCHEDULES

A list of sampling sites (as of December 1987) and a summary of sampler distances from the ground and from roadways is given in *Table 1*. All sites were located in commercial areas close to or in the central business districts of the respective cities. Only the Sydney site was close to a large industrial point source. The Vancouver site (00118) was relocated in December 1986 and the Regina site was relocated in September 1986. Since the relocation distances were relatively small, the data from the previous and present sites have been combined.

Normally, all samples were collected over a 24h sampling period on a six day sampling schedule. The two Vancouver sites operated on a three-day sampling schedule from January 1985 to December 1987. Ten of the seventeen sites were operational by the end of May 1984; five sites did not begin operation until August 1984 and one site (Victoria) produced no valid PM_{10} data during 1984. The Windsor site began operation in July 1987. Data from St. John's is available only for the period September 1984 to October 1985.

3. METHODOLOGY

3.1 Sampling Equipment

As shown in *Table 1*, fourteen sites were equipped with dichotomous samplers and five sites with size selective hi-vol (SSI) samplers. Two sites, Ottawa and Edmonton, had both SSI and dichotomous samplers.

The dichotomous samplers were manufactured by Sierra-Andersen and divide 10 μm inhalable particulate into two size fractions above and below 2.5 μm (see *Figure 1*). These two fractions are referred to as the **COARSE** and **FINE** fractions respectively. The

FIGURE 1 - SIERRA-ANDERSEN DICHOTOMOUS SAMPLER

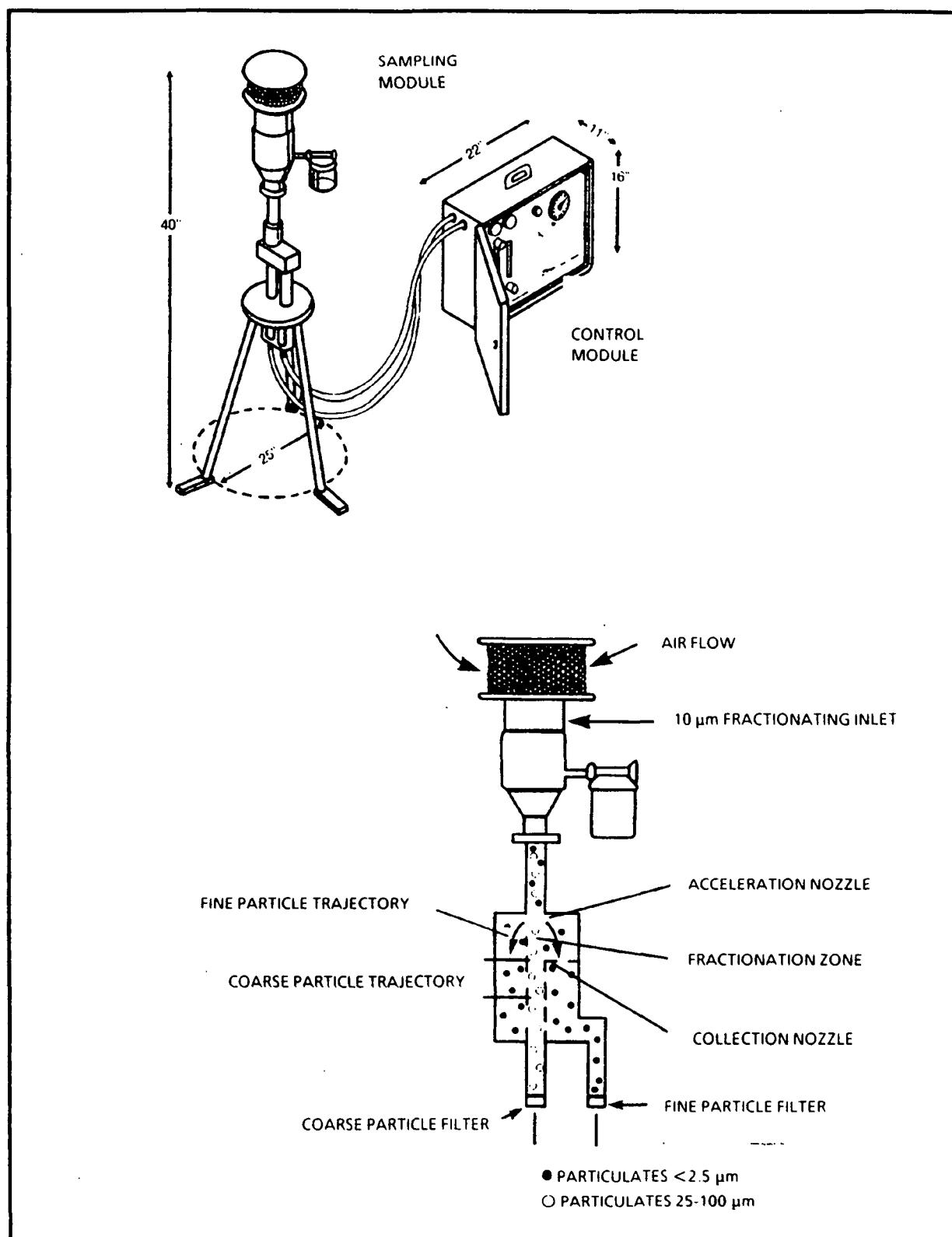


TABLE 1 - INHALABLE PARTICULATE SAMPLING LOCATIONS

Station No.	City	Address	Sampler Type Dichot (D) SSI (S)	Height Above Ground (m)	Distance to Roadway (m)	Roadway ADT (veh/day)
10101	St. John's	Duckworth/Ordinance	D	9	35	<10,000
30101	Halifax	N.S. Technical College	D	12	100	10,000
50104	Montreal	1125 Ontario Est	D	13	10	32,000
50109	Montreal	Duncan/Decarie	D	4	20	>100,000
50307	Quebec City	Parc Cartier Breboeuf	D	4	75	2,500
60104	Ottawa	Rideau/Wurtemburg	D,S	4	80	32,000
60417	Toronto	26 Breadalbane Street	D	16	100	52,000
60204	Windsor	471 University Avenue	D	12	--	--
70119	Winnipeg	65 Ellen Street	D	4	55	14,000
90130	Edmonton	10255-104th Street	D,S	6	5	10,400
90204	Calgary	316-7th Avenue	D	9	25	16,000
00118*	Vancouver	2550 West 10th Avenue	D	17	25	<4,000
00111	Vancouver	Rocky Pt. Park	D	4	300	28,000
00303	Victoria	1250 Quadra St.	D	12	18	12,000
30311	Sydney	Whitney Pier Fire Stn.	S	2	--	--
40201	Saint John	110 Charlotte Street	S	17	10	<10,000
80110+	Regina	3211 Albert Street	S	8	20	50,000

* Relocated from site 00106 in Dec. 86

+ Relocated from site 80109 in Sept. 86

samplers were operated at a total flowrate of 16.7 L/min; particulates were collected on Tefweb polyolefin ring-supported Teflon membrane filters manufactured by Ghia Corporation (2 μm effective pore diameter).

The size selective inlet hi-vol samplers utilized a General Metal Works (GMW) base, a Moore and Gentry flow controller and a Sierra-Andersen S/A-321 10 μm inlet. Particulates were collected on Pallflex Emfab Teflon coated glass fibre filters, shown to reduce artifact sulphate and nitrate formation.¹ The operating flowrate was 1.13 m^3/min (40 cfm).

The S/A-321 inlet has been shown to allow large particle pass-through (from bounce and/or re-entrainment)

resulting in an overestimation of PM_{10} concentrations.⁶ This overestimation is most significant when coarse particle loadings are high. The inlets on all samplers were replaced in December 1988 with Sierra-Andersen 1200 inlet heads.

Standard hi-vol samplers were also operated at each site in order to provide total suspended particulate (TSP) measurements. All hi-vol samplers, except those in Toronto and Windsor employed low artifact filter media (see Table 2). The sampling effectiveness of the hi-vol is wind dependent with a cutpoint of about 50 μm with 2 km/h winds and about 22 μm with 24 km/h winds.⁷ The hi-vols were operated at flowrates of 1.13 to 1.41 m^3/min .

TABLE 2 - INHALABLE PARTICULATE SAMPLE PROCESSING

Station No.	City	Address	Sampler Type Dichot (D) SSI (S)	Hi-Vol Filter Type	Hi-Vol Mass Determ.	Hi-Vol Pb, SO ₄ , NO ₃ Determ.
10101	St. John's	Duckworth/Ordinance	D	Pall ¹	PMD	CD
30101	Halifax	N.S. Technical College	D	Pall	NS	CD
50104	Montreal	1125 Ontario Est	D	Gel-A ²	MUC	MUC
50109	Montreal	Duncan/Decarie	D	Gel-A ²	MUC	MUC
50307	Quebec City	Parc Cartier Breboeuf	D	Pall	QUE	QUE
60104	Ottawa	Rideau/Wurtemburg	D,S	Pall	PMD	CD
60417	Toronto	26 Breadalbane Street	D	Gel-AE ³	ONT	ONT
60204	Windsor	471 University Avenue	D	Gel-AE	ONT	ONT
70119	Winnipeg	65 Ellen Street	D	Pall	MAN	MAN
90130	Edmonton	10255-104th Street	D,S	Pall	ALTA	ALTA
90204	Calgary	316-7th Avenue	D	Pall	ALTA	ALTA
00118*	Vancouver	2550 West 10th Avenue	D	Pall	GVRD	CD
00111	Vancouver	Rocky Pt. Park	D	Pall	GVRD	CD
00303	Victoria	1250 Quadra St.	D	Pall	PMD	CD
30311	Sydney	Whitney Pier Fire Stn.	S	Pall	NS	CD
40201	Saint John	110 Charlotte Street	S	Pall	NB	CD
80110+	Regina	3211 Albert Street	S	Pall	PMD	CD

¹ Pallflex Emfab² Gelman A (Pre-washed)³ Gelman AE

3.2 Analysis

3.2.1 Mass. All PM₁₀ mass determinations (both SSI and dichotomous) were performed by Pollution Measurement Division in Ottawa. Dichotomous sampler filters were shipped to and from the field loaded in plastic rings which were designed to fit directly into the Andersen samplers. The filters, in their rings, were packaged in plastic petri dishes and shipped in a wooden box designed to hold them in an upright position. Mass measurements were made using an electronic microbalance. All filters were conditioned at 25°C and 50% relative humidity prior to mass determination.

3.2.2 Sulphate/Nitrate. All analyses were performed by Chemistry Division

(CD) of RRETC, Ottawa. Sulphate and nitrate analyses on dichotomous filter samples (fine and coarse) were performed using a Dionex ion chromatograph equipped with a HPIC-AS4A anion exchange separator column with a carbonate/bicarbonate buffer eluant. Detection was by conductivity with chemical eluant suppression. Filters were extracted with water in an ultrasonic bath.

For SSI filter cuttings, sulphates and nitrate analyses were carried out using an automated Technicon methyl thymol blue method.

As shown in Table 2, hi-vol filter cuttings were analyzed either by CD Ottawa or by the respective operating agencies. Sulphate and nitrate

determinations on hi-vol filter samples processed by Ottawa were made using the Technicon method.

3.2.3 Multi-element Analysis. Lead analyses for SSI filter cuttings and for hi-vol filter cuttings processed in Ottawa were carried out using a wavelength dispersive X-ray fluorescence spectrometer.

Beginning in November 1985, every fifth set of dichotomous filters from each site were submitted for multi-element analysis. As of December 1986, all dichotomous filter samples were analyzed for the list of elements shown in *Table 3*. Multi-element analyses were carried out by CD using a Kevex 770/8000 energy dispersive X-ray fluorescence (EDXRF) spectrometer. Three different measurement conditions were used.

4. QUALITY ASSURANCE

4.1 Samplers

Dichotomous samplers, SSI hi-vols and regular hi-vols were calibrated and operated in the field by the respective provincial or municipal environment agencies. Periodic audits of the samplers were carried out by Environment Canada staff using reference flow control devices. The United States EPA Inhalable Particulate Network Operation and Quality Assurance Manual was used as a guidance document.

4.2 Mass Determinations

A polonium radioactive source was used as a static charge control device when weighing dichotomous, SSI and hi-vol filters. Standard sets of filter were weighed periodically to verify precision and accuracy of the balance. Repeat weighing of exposed filters were carried out on a systematic basis. A dedicated temperature and humidity

controlled room was used to carry out mass determinations.

TABLE 3 - SUMMARY of ELEMENTS ON DICHOTOMOUS FILTER SAMPLES

Element	Symbol	Detection Limit (ng/m ³)
Aluminum	Al	3.9
Silicon	Si	1.8
Phosphorus	P	0.8
Sulphur	S	0.7
Chlorine	Cl	1.9
Potassium	K	1.8
Calcium	Ca	2.2
Scandium	Sc	2.5
Titanium	Ti	4.9
Vanadium	V	3.9
Chromium	Cr	3.2
Manganese	Mn	2.1
Iron	Fe	2.3
Cobalt	Co	1.4
Nickel	Ni	1.1
Copper	Cu	1.7
Zinc	Zn	1.1
Gallium	Ga	1.2
Germanium	Ge	0.8
Arsenic	As	0.5
Selenium	Se	0.5
Bromine	Br	0.4
Rubidium	Rb	0.3
Strontium	Sr	0.3
Yttrium	Y	0.3
Zirconium	Zr	0.4
Niobium	Nb	0.5
Molybdenum	Mo	0.6
Palladium	Pd	2.4
Silver	Ag	2.6
Cadmium	Cd	3.3
Indium	In	3.5
Tin	Sn	4.3
Antimony	Sb	4.7
Tellurium	Te	4.8
Iodine	I	5.0
Cesium	Cs	8.9
Barium	Ba	11.9
Lanthanum	La	15.5
Lead	Pb	0.8

It should be noted that TSP determinations were made by nine different agencies. No interlaboratory

comparison of hi-vol mass determinations has been carried out to date.

4.3 Analytical

Complete details of analytical quality assurance procedures will not be included in this report. Information on calibration and quality control techniques for EDXRF and IC analyses is available from CD, Ottawa.

4.4 EPA Reference Method for PM₁₀

The United States EPA has published a reference method for the determination of particulate matter as PM₁₀ in the atmosphere.⁸ Manufacturers of sampling equipment are required to undergo a rigorous program of laboratory and field testing to obtain certification as a reference or equivalent PM₁₀ monitoring method.^{8,9} Instruments are required to have a 50% cutpoint of $10 \pm 0.5 \mu\text{m}$ aerodynamic diameter and a precision of $\pm 5 \mu\text{g}/\text{m}^3$ for PM₁₀ concentrations $<80 \mu\text{g}/\text{m}^3$ and $\pm 7\%$ for PM₁₀ concentrations $>80 \mu\text{g}/\text{m}^3$. The average 24h flow rate must be within $\pm 5\%$ of the initial flowrate. As discussed in Section 3.1, because of large particle pass through problems, the S/A 321 inlet could not pass EPA equivalency certification. The Sierra-Andersen Model 241 dichotomous sampler and the Sierra-Andersen Model 1200 SSI hi-vol have received equivalency certification.⁹

5. RESULTS and DISCUSSIONS

5.1 Air Quality Objectives

A Canadian national ambient air quality objective for PM₁₀ has not yet been established. In 1987, the United States did replace their total suspended particulate (TSP) standards with PM₁₀ standards as shown in Table 5. The U.S. primary standards are not directly comparable to Canadian air quality objectives. As shown in Table 5,

the original U.S. primary TSP standard was substantially higher than the Canadian maximum acceptable air quality objective.

5.2 PM₁₀ Measurements

5.2.1 Mass. The means of the fine ($<2.5 \mu\text{m}$) and coarse (2.5 to 10 μm) PM₁₀ mass fractions and the mean total PM₁₀ mass

TABLE 4 - U.S. EPA PM₁₀ METHODOLOGY REQUIREMENTS

Filter	
Collection Efficiency:	>99% for 0.3 μm DOP test
Integrity:	blank filter losses/gains equivalent to 5 $\mu\text{g}/\text{m}^3$ of PM ₁₀ (filter cassette recommended)
Alkalinity:	
	<25 microequivalents/gm of filter
Filter Conditioning	
Temp. Range:	15° to 30°C
Temp. Control:	±3°C
Humidity Range:	20% to 45% RH
Humidity Control:	±5% RH
Flow Measurement	
Accuracy:	±2%
Calibration:	Reference to primary standard

TABLE 5
TSP and PM₁₀ AIR QUALITY STANDARDS
CANADA and the UNITED STATES

Avg. Time	CANADA (Maximum Acceptable Level) TSP ($\mu\text{g}/\text{m}^3$)	U.S. (Primary Standard)	
		TSP ($\mu\text{g}/\text{m}^3$)*	PM ₁₀ ($\mu\text{g}/\text{m}^3$)
24h	120	260	150
Annual	60 ^a	75 ^a	50 ^b

^a Geometric mean ^b Arithmetic mean

* Withdrawn in 1987

concentrations for the dichotomous sampler sites are presented in *Table 6*. Also included are the mean fine/coarse mass ratios and associated standard deviations. For the SSI sites, mean PM₁₀ mass loadings are given. As noted in Section 2, the Windsor site did not begin operation until July 1987 and data from St. John's are only available for 1985. For the other sites, the total number of sampling days in the May 1984 to December 1987 period ranged from 131 to 259.

Mean PM₁₀ mass concentrations ranged from 17 µg/m³ in St. John's to 49 µg/m³ at the Montreal Duncan/Decarie monitoring site. Eastern sites tended to have a higher fine fraction of PM₁₀ and higher fine/coarse ratios than the western sites. The Montreal Duncan-Decarie site and the Edmonton site had the highest coarse particulate loadings and the lowest fine/coarse ratios. Only the Montreal Duncan/Decarie site came close to exceeding the U.S. annual average primary standard for PM₁₀.

As previously discussed, the S/A 321 SSI hi-vol inlet has been shown to overcollect coarse particulates resulting in an overestimation of PM₁₀ levels. This error has been shown to be as high as +25% at sites with high coarse loadings.⁶ From *Table 6* it can be seen that the mean PM₁₀ concentration at Edmonton as recorded by the SSI was 28% higher than that measured by the dichotomous sampler (46 µg/m³ vs 36 µg/m³). At Ottawa, the SSI mean PM₁₀ concentration was essentially the same as that measured by the dichotomous sampler. Coarse particulate loadings at the Ottawa site were approximately half of those at the Edmonton site. Further discussion of SSI/dichotomous sampler differences are contained in Section 5.3.

Table 7 contains a frequency distribution of 24h PM₁₀ mass concentrations for each site. Few 24h PM₁₀ concentrations greater than the proposed 24h EPA primary standard of 150 µg/m³ were recorded. The distribution

of sampling days within selected ranges of PM₁₀ mass concentrations is shown in *Table 8*. The Federal Provincial Advisory Committee on Air Quality (FPACAQ) Index Subcommittee has proposed these interim PM₁₀ ranges for use with a new index system. Values of 0-50 µg/m³ would be characterized as good, 51-100 as fair, 101-150 as poor and >150 µg/m³ as very poor.

A comparison of PM₁₀ concentrations for selected sites in the United States and Canadian cities is given in *Figure 2*. Plotted are 90th percentile and 50th percentile concentrations. The United States data is for 1986 for the cities of Steubenville, Ohio (STE), Watertown, Massachusetts, (WAT), Topeka, Kansas (TOP) and St. Louis, Missouri (STL).¹⁰ Steubenville is a heavily industrialized city of 26,000, Watertown is a residential, non-industrial suburb of Boston, Topeka is a non-industrial city of 120,000 and St. Louis is an industrialized metropolitan city of 425,000.

5.2.2. Sulphate. A dichotomous sampler equipped with teflon filter media is the preferred sampling system for sulphate in ambient air.^{1,11} The teflon coated glass fibre filter used on the SSI hi-vols has been shown to have low sulphate artifact but would be expected to produce somewhat higher particulate sulphate concentrations than a dichotomous sampler at the same site.

Table 9 contains mean fine (<2.5 µm), coarse (2.5 to 10 µm), and total sulphate loadings for the dichotomous sampler sites. Also shown are the mean fine/coarse sulphate ratios and associated standard deviations. For the SSI sites, mean total sulphate loadings are given.

For sites with a complete data set, mean total sulphate concentrations ranged from 5.6 µg/m³ at Halifax to 1.7 µg/m³ at Edmonton. Sulphate loadings at eastern sites were typically 2 to 3 times higher than loadings at western sites.

Table 6: Mean PM10 Mass Loadings and Fine/Coarse Ratios
(May 1984 - December 1987)

Station Number	City	SSI(S) Dichot(D)	Number of Samples	Mean Coarse ($\mu\text{g}/\text{m}^3$)	Mean Fine ($\mu\text{g}/\text{m}^3$)	Mean Total ($\mu\text{g}/\text{m}^3$)	Mean F/C Ratio	Std. Dev. Ratio
10101	ST. JOHN'S	D	39	7	10	17	1.5	1.0
30101	HALIFAX	D	182	14	16	30	1.3	0.8
30311	SYDNEY	S	199	-	-	34	-	-
40201	SAINT JOHN	S	189	-	-	24	-	-
50104	MONTREAL	D	208	15	20	35	2.1	3.1
50109	MONTREAL	D	168	26	23	49	1.0	0.6
50307	QUEBEC CITY	D	127	11	12	23	1.5	1.6
60104	OTTAWA	D	212	10	13	23	1.7	1.4
60417	TORONTO	D	167	11	17	28	2.0	1.5
60204	WINDSOR	D	22	17	22	39	1.5	0.6
70119	WINNIPEG	D	178	18	13	31	1.1	1.2
80110	REGINA	S	196	-	-	37	-	-
90130	EDMONTON	D	167	21	14	36	0.9	1.0
90204	CALGARY	D	187	18	14	32	1.1	1.2
00118	VANCOUVER	D	182	11	16	27	1.7	1.2
00111	VANCOUVER	D	259	14	17	31	1.5	1.1
00303	VICTORIA	D	131	7	14	21	2.2	1.5
60104	OTTAWA	S	211	-	-	24	-	-
90130	EDMONTON	S	195	-	-	46	-	-

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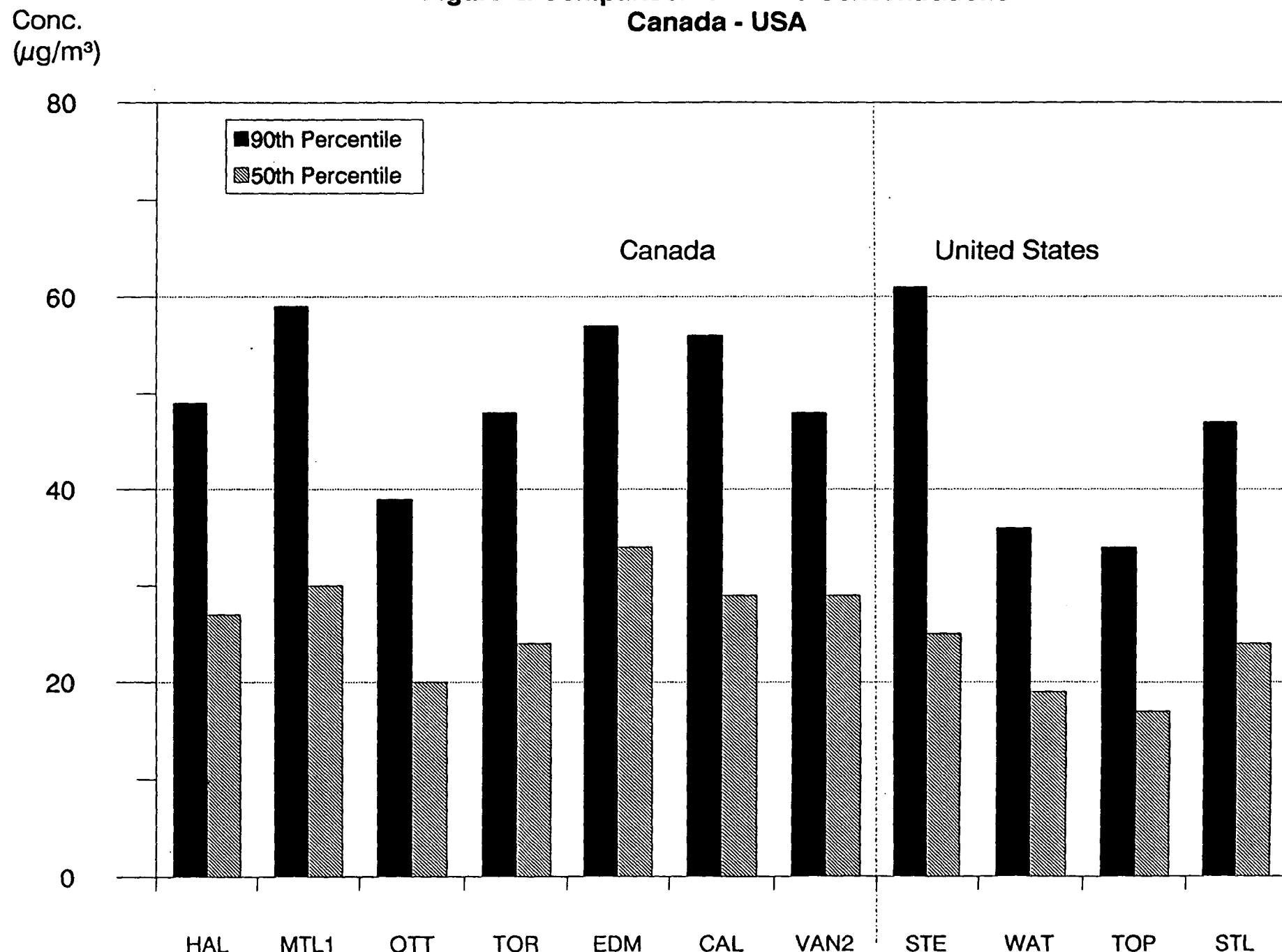
**Table 7: Frequency Distribution of PM10 Mass ($\mu\text{g}/\text{m}^3$)
(May 1984 - December 1987)**

Station	City	SSI(S) Dich(D)	No. of Samples	Frequency Distribution															Max.	Mean	Std. Dev.
				Min.	5	10	20	30	40	50	60	70	80	90	95	98	99				
10101	ST. JOHN'S	D	39	2	3	5	11	12	14	16	19	22	25	29	31	34	34	34	17	8	
30101	HALIFAX	D	182	10	14	17	19	21	25	27	31	35	40	49	56	75	81	85	30	14	
30311	SYDNEY	S	199	2	9	12	16	21	22	27	31	36	43	61	87	172	192	194	34	30	
40201	SAINT JOHN	S	189	0	12	13	15	16	20	22	26	29	32	37	45	57	60	64	24	11	
50104	MONTREAL	D	208	9	13	16	20	24	27	30	35	39	47	59	68	82	104	154	35	20	
50109	MONTREAL	D	168	12	20	23	30	34	39	42	49	55	68	83	97	116	126	175	49	25	
50307	QUEBEC CITY	D	127	6	10	12	13	15	17	19	23	28	33	40	43	57	58	61	23	12	
60104	OTTAWA	D	212	5	8	10	13	16	18	20	23	27	33	39	49	59	60	65	23	12	
60417	TORONTO	D	167	8	11	12	16	19	22	24	27	32	38	48	51	67	83	91	28	14	
60204	WINDSOR	D	22	11	14	17	26	28	28	32	37	40	54	63	92	100	100	100	39	23	
70119	WINNIPEG	D	178	6	11	13	17	19	23	25	30	36	40	53	63	95	99	112	31	19	
80110	REGINA	S	196	6	10	13	17	23	27	32	40	47	55	69	82	93	98	105	37	22	
90130	EDMONTON	D	167	9	15	20	24	28	30	34	37	43	47	54	60	73	84	86	36	14	
90204	CALGARY	D	187	4	11	14	17	21	25	29	33	35	41	56	72	82	89	114	32	18	
00118	VANCOUVER	D	182	6	12	14	16	19	21	24	27	29	34	50	56	69	84	84	27	14	
00111	VANCOUVER	D	259	9	13	15	20	23	26	29	34	38	43	48	56	68	73	82	31	14	
00303	VICTORIA	D	131	4	9	10	12	14	16	18	21	23	28	34	44	51	52	59	21	11	
60104	OTTAWA	S	211	4	9	10	14	17	19	20	23	27	31	40	52	63	66	80	24	13	
90130	EDMONTON	S	195	8	13	19	24	30	35	40	44	49	60	82	112	136	163	185	46	29	

Table 8: Summary of PM10 Concentrations Within Selected Ranges
(May 1984 - December 1987)

Station	City	SSI(S) Dich(D)	Total No. of Days	No. of Days with PM10 Concentration ($\mu\text{g}/\text{m}^3$)			
				0-50	51-100	101-150	>150
10101	ST. JOHN'S	D	39	39	0	0	0
30101	HALIFAX	D	182	166	16	0	0
30311	SYDNEY	S	199	173	18	3	5
40201	SAINT JOHN	S	189	184	5	0	0
50104	MONTREAL	D	208	174	30	3	1
50109	MONTREAL	D	168	104	57	6	1
50307	QUEBEC CITY	D	127	122	5	0	0
60104	OTTAWA	D	212	204	8	0	0
60417	TORONTO	D	167	158	9	0	0
60204	WINDSOR	D	22	17	5	0	0
70119	WINNIPEG	D	178	157	20	1	0
80110	REGINA	S	196	146	49	1	0
90130	EDMONTON	D	167	147	20	0	0
90204	CALGARY	D	187	163	23	1	0
00118	VANCOUVER	D	182	165	17	0	0
00111	VANCOUVER	D	259	240	19	0	0
00303	VICTORIA	D	131	128	3	0	0
60104	OTTAWA	S	211	200	11	0	0
90130	EDMONTON	S	195	140	44	9	2

Figure 2: Comparison of PM10 Concentrations
Canada - USA



**Table 9: Mean SO₄ Loadings and Fine/Coarse Ratios
(May 1984 - December 1987)**

Station Number	City	SSI(S) Dichot(D)	Number of Samples	Mean Coarse ($\mu\text{g}/\text{m}^3$)	Mean Fine ($\mu\text{g}/\text{m}^3$)	Mean Total ($\mu\text{g}/\text{m}^3$)	Mean F/C Ratio	Std. Dev. Ratio
10101	ST. JOHN'S	D	38	0.4	2.6	3.0	6.8	3.4
30101	HALIFAX	D	189	0.4	5.1	5.6	14.3	15.4
30311	SYDNEY	S	204	-	-	4.1	-	-
40201	SAINT JOHN	S	194	-	-	5.0	-	-
50104	MONTREAL	D	210	0.5	4.1	4.6	16.3	68.8
50109	MONTREAL	D	168	0.6	4.2	4.8	10.1	21.4
50307	QUEBEC CITY	D	149	0.4	2.5	2.8	11.5	35.3
60104	OTTAWA	D	209	0.3	3.7	3.9	19.0	35.8
60417	TORONTO	D	166	0.4	4.5	4.9	12.1	9.9
60204	WINDSOR	D	22	0.5	6.7	7.1	15.8	15.9
70119	WINNIPEG	D	179	0.3	1.6	1.9	6.4	4.3
80110	REGINA	S	201	-	-	2.3	-	-
90130	EDMONTON	D	185	0.3	1.5	1.7	6.5	5.7
90204	CALGARY	D	187	0.3	1.6	1.9	6.1	7.4
00118	VANCOUVER	D	181	0.3	2.2	2.6	7.5	4.2
00111	VANCOUVER	D	253	0.3	2.1	2.4	7.7	4.4
00303	VICTORIA	D	131	1.0	1.9	2.8	6.5	4.1
60104	OTTAWA	S	216	-	-	4.7	-	-
90130	EDMONTON	S	201	-	-	2.7	-	-

As shown in *Table 9*, sulphate is associated predominantly with the fine fraction of particulate matter. Excluding Victoria, coarse sulphate loadings were similar across the country with a range of 0.3 to 0.6 $\mu\text{g}/\text{m}^3$. Victoria had the highest coarse sulphate concentrations (1.0 $\mu\text{g}/\text{m}^3$); this sulphate probably originates from ocean aerosols.

In *Table 10*, the frequency distribution of 24h total sulphate concentrations for the PM_{10} sampling sites are given. Maximum sulphate concentrations of $>25 \mu\text{g}/\text{m}^3$ were measured at the two Montreal sites and at all the Ontario sites.

In *Table 11*, the fine sulphate is given as a fraction of fine particulate mass for each dichotomous sampler site. At the eastern sites, sulphates accounted for 17% to 31% of total fine particulate mass with a median value of 24%. At the western sites, sulphate accounted for 11% to 15% of fine particulate mass.

5.2.3. Nitrate. Because of the volatility of particulate nitrate, losses can occur from filter media during sampling. This effect can be significant for both low volume techniques such as the dichotomous sampler and hi-volume techniques such as the SSI hi-vol. Offsetting this loss, filter media can absorb nitric acid which will be measured by the analytical method as nitrate, resulting in a positive nitrate "artifact".^{3,12,13} Nitric acid adsorption would be more significant for the SSI hi-vols than for dichotomous samplers.

The means of the fine, coarse and total nitrate concentrations for the dichotomous samplers are given in *Table 12*. Mean fine/coarse nitrate ratios and associated standard deviations are also given. For the SSI sites, mean total nitrate loadings are shown.

Mean total nitrate loadings ranged from 0.6 to 1.5 $\mu\text{g}/\text{m}^3$. As for sulphate, Victoria had the highest coarse nitrate

concentration (0.9 $\mu\text{g}/\text{m}^3$) of any site. The Toronto and the two Montreal sites had the highest fine particulate nitrate concentrations.

5.2.4 Other Elements. As noted in Section 3.2.3, a subset of filters were submitted for multi-element energy dispersive x-ray fluorescence (EDXRF) analysis. A total of 40 elements in addition to sulphate, nitrate and mass were determined for these samples. *Table 13* provides a summary of the number of samples for each site that were submitted for multi-element analysis. The dates of the samples and the mean PM_{10} mass concentrations of the samples analyzed by EDXRF vs mean PM_{10} concentrations) for all samples for the site are also given. One additional site (Walpole Island) was available for the EDXRF data set. This site is a rural site located on an island in Lake St. Clair.

Mean fine, coarse and total concentrations for each element are given in *Tables A1 to A43* of *Appendix A*. *Tables B1 to B43* of *Appendix B* contain frequency distributions of total elemental concentrations.

Comparisons of concentrations of 15 selected elements by city are given in *Figures 3 to 6*. Crustal elements such as aluminum (Al), silicon (Si), calcium (Ca) and Iron (Fe) are associated with the coarse fraction of PM_{10} and originate primarily from wind blown dust and road dust. Chlorine is also associated with coarse particles and is associated mainly with roadway salting and marine aerosols.

Sulphur comes predominantly from secondary sulphate and, as discussed in the sulphate section, is associated almost entirely with the fine fraction of PM_{10} . There was an excellent correlation between EDXRF sulphur versus ion chromatography sulphate (see *Figure 7*). Based on molecular weight, if

**Table 10 : Frequency Distribution of Sulphate (SO₄) Concentrations (μg/m³)
(May 1984 - December 1987)**

Station	City	SSI(S) Dich(D)	No. of Samples	Frequency Distribution	Min.	5	10	20	30	40	50	60	70	80	90	95	98	99	Max.	Mean	Std. Dev.
10101	ST. JOHN'S	D	38	0.0	0.7	1.2	1.5	1.9	2.5	2.7	3.3	4.0	4.6	5.1	5.8	6.4	6.4	6.4	3.0	1.5	
30101	HALIFAX	D	189	0.9	1.7	2.1	2.8	3.4	3.9	4.7	5.5	6.4	8.0	10.5	12.0	16.2	18.7	21.7	5.6	3.5	
30311	SYDNEY	S	204	1.1	1.5	1.9	2.4	2.7	3.1	3.5	4.0	4.5	5.6	7.0	9.3	10.9	11.3	15.3	4.1	2.3	
40201	SAIN'T JOHN	S	194	0.0	1.7	2.0	2.9	3.4	3.8	4.5	5.1	5.5	6.4	8.4	11.2	13.6	14.6	21.3	5.0	2.9	
50104	MONTREAL	D	210	0.3	1.0	1.2	1.7	2.3	2.9	3.5	4.4	5.4	6.8	9.3	12.1	15.4	16.6	28.1	4.6	3.9	
50109	MONTREAL	D	168	0.2	1.0	1.3	1.8	2.5	3.1	3.8	4.7	5.3	7.2	10.0	10.8	13.4	17.1	33.3	4.8	3.9	
50307	QUEBEC CITY	D	149	0.4	0.5	0.7	1.1	1.4	1.8	2.2	2.7	3.3	4.1	6.4	7.3	8.8	10.0	17.1	2.8	2.3	
60104	OTTAWA	D	209	0.0	0.7	1.0	1.3	1.8	2.2	2.8	3.5	4.6	5.4	8.1	11.4	14.1	24.3	29.3	3.9	4.1	
60417	TORONTO	D	166	0.1	0.7	1.3	1.7	2.3	3.0	3.6	4.5	5.7	7.4	9.5	13.3	16.1	29.1	40.4	4.9	4.9	
60204	WINDSOR	D	22	1.1	1.6	2.6	3.1	3.4	3.8	6.1	6.9	7.7	11.2	12.0	15.4	27.9	27.9	7.1	6.0		
70119	WINNIPEG	D	179	0.0	0.5	0.7	1.0	1.2	1.4	1.6	1.9	2.3	2.8	3.5	4.4	5.0	6.6	6.9	1.9	1.2	
80110	REGINA	S	201	0.0	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	3.1	3.5	4.2	5.5	6.0	10.8	2.3	1.2	
90130	EDMONTON	D	185	0.0	0.5	0.6	0.8	0.9	1.1	1.3	1.6	1.9	2.4	3.4	4.7	6.8	8.6	12.6	1.7	1.6	
90204	CALGARY	D	187	0.3	0.4	0.5	0.7	0.9	1.1	1.3	1.6	1.8	2.2	3.7	5.4	11.4	15.1	18.9	1.9	2.4	
00118	VANCOUVER	D	181	0.5	1.0	1.2	1.4	1.6	2.0	2.2	2.5	3.0	3.7	4.5	5.2	6.4	6.8	9.0	2.6	1.4	
00111	VANCOUVER	D	253	0.0	0.7	0.9	1.2	1.5	1.7	2.1	2.5	3.0	3.5	4.3	5.0	5.6	6.2	8.5	2.4	1.4	
00303	VICTORIA	D	131	0.2	0.9	1.1	1.3	1.5	1.6	1.9	2.1	2.3	3.0	3.7	4.9	6.6	13.4	81.6	2.8	7.1	
60104	OTTAWA	S	216	0.1	1.1	1.4	2.0	2.4	3.1	3.8	4.4	5.5	6.6	8.8	12.8	16.7	24.1	25.3	4.7	3.9	
90130	EDMONTON	S	201	0.5	0.9	1.1	1.4	1.5	1.8	2.1	2.4	2.8	3.3	4.3	6.6	9.7	10.5	21.9	2.7	2.5	

**Table 11: Fine Sulphate as a Fraction of Fine Mass at Dichotomous Sampler Sites
(May 1984 - December 1987)**

Station Number	City	No. of Samples	Mean Fine SO ₄ ($\mu\text{g}/\text{m}^3$)	Mean Fine Mass ($\mu\text{g}/\text{m}^3$)	Mean SO ₄ /Mass Ratio	Std. Dev. Ratio	Maximum Ratio
10101	ST. JOHN'S	37	2.6	10.2	0.24	0.09	0.43
30101	HALIFAX	182	5.1	16.2	0.31	0.11	0.79
50104	MONTREAL	208	4.1	19.7	0.21	0.10	0.60
50109	MONTREAL	167	4.2	23.1	0.17	0.09	0.49
50307	QUEBEC CITY	125	2.3	11.8	0.20	0.12	0.94
60104	OTTAWA	209	3.7	13.2	0.25	0.11	0.64
60417	TORONTO	164	4.5	17.0	0.24	0.11	0.75
60204	WINDSOR	22	6.7	22.5	0.27	0.10	0.45
70119	WINNIPEG	177	1.6	12.7	0.14	0.08	0.39
90130	EDMONTON	170	1.5	14.5	0.11	0.08	0.49
90204	CALGARY	186	1.6	14.0	0.12	0.09	0.56
00118	VANCOUVER	180	2.2	16.3	0.15	0.06	0.37
00111	VANCOUVER	252	2.1	16.8	0.13	0.07	0.36
00303	VICTORIA	130	1.9	13.8	0.15	0.06	0.33

**Table 12: Mean Nitrate (NO₃) Loadings and Fine/Coarse Ratios
(May 1984 - December 1987)**

Station Number	City	SSI(S) Dichot(D)	Number of Samples	Mean Coarse ($\mu\text{g}/\text{m}^3$)	Mean Fine ($\mu\text{g}/\text{m}^3$)	Mean Total ($\mu\text{g}/\text{m}^3$)	Mean F/C Ratio	Std. Dev. Ratio
10101	ST. JOHN'S	D	39	0.3	0.2	0.4	0.8	0.5
30101	HALIFAX	D	189	0.4	0.2	0.6	0.6	0.5
30311	SYDNEY	S	204	-	-	0.6	-	-
40201	SAINT JOHN	S	194	-	-	0.8	-	-
50104	MONTREAL	D	210	0.5	1.0	1.5	2.7	5.0
50109	MONTREAL	D	166	0.5	1.0	1.5	2.0	2.6
50307	QUEBEC CITY	D	149	0.3	0.5	0.8	2.7	16.0
60104	OTTAWA	D	206	0.4	0.5	0.9	1.3	1.9
60417	TORONTO	D	166	0.6	1.1	1.7	2.2	3.1
60204	WINDSOR	D	22	0.6	0.8	1.4	1.6	1.9
70119	WINNIPEG	D	179	0.3	0.5	0.7	2.0	3.5
80110	REGINA	S	201	-	-	0.9	-	-
90130	EDMONTON	D	185	0.3	0.7	1.0	2.6	4.9
90204	CALGARY	D	187	0.3	0.7	1.0	3.4	7.4
00118	VANCOUVER	D	181	0.5	0.6	1.1	1.5	1.9
00111	VANCOUVER	D	253	0.5	0.4	0.9	1.1	1.3
00303	VICTORIA	D	131	0.9	0.5	1.4	2.2	5.5
60104	OTTAWA	S	216	-	-	0.8	-	-
90130	EDMONTON	S	201	-	-	1.1	-	-

Table 13: Summary of Dichotomous Filter Samples Analyzed by EDXRF

Station Number	City	No. of Samples Analyzed by EDXRF	Start Date	End Date	MeanPM10 ($\mu\text{g}/\text{m}^3$) All Samples	Mean PM10 ($\mu\text{g}/\text{m}^3$) EDXRF Samples
30101	HALIFAX	50	Nov-85	Aug-87	30	26
50104	MONTREAL	54	Nov-85	Aug-87	35	32
50109	MONTREAL	40	Nov-85	Aug-87	49	48
50307	QUEBEC CITY	53	Nov-85	Jul-87	23	24
60104	OTTAWA	47	Nov-85	Aug-87	23	24
60417	TORONTO	39	Nov-85	May-87	28	27
60204	WINDSOR	67	Jul-87	Oct-88	39	37
61901	WALPOLE ISLAND	23	Jan-88	Sep-88	27	27
70119	WINNIPEG	40	Jan-86	Jul-88	31	30
90130	EDMONTON	34	Nov-85	Jul-87	37	33
90204	CALGARY	49	Nov-85	Aug-87	32	29
00118	VANCOUVER	38	Nov-85	May-87	27	30
00111	VANCOUVER	68	Nov-85	Dec-87	31	32
00303	VICTORIA	54	Nov-85	Dec-87	21	21

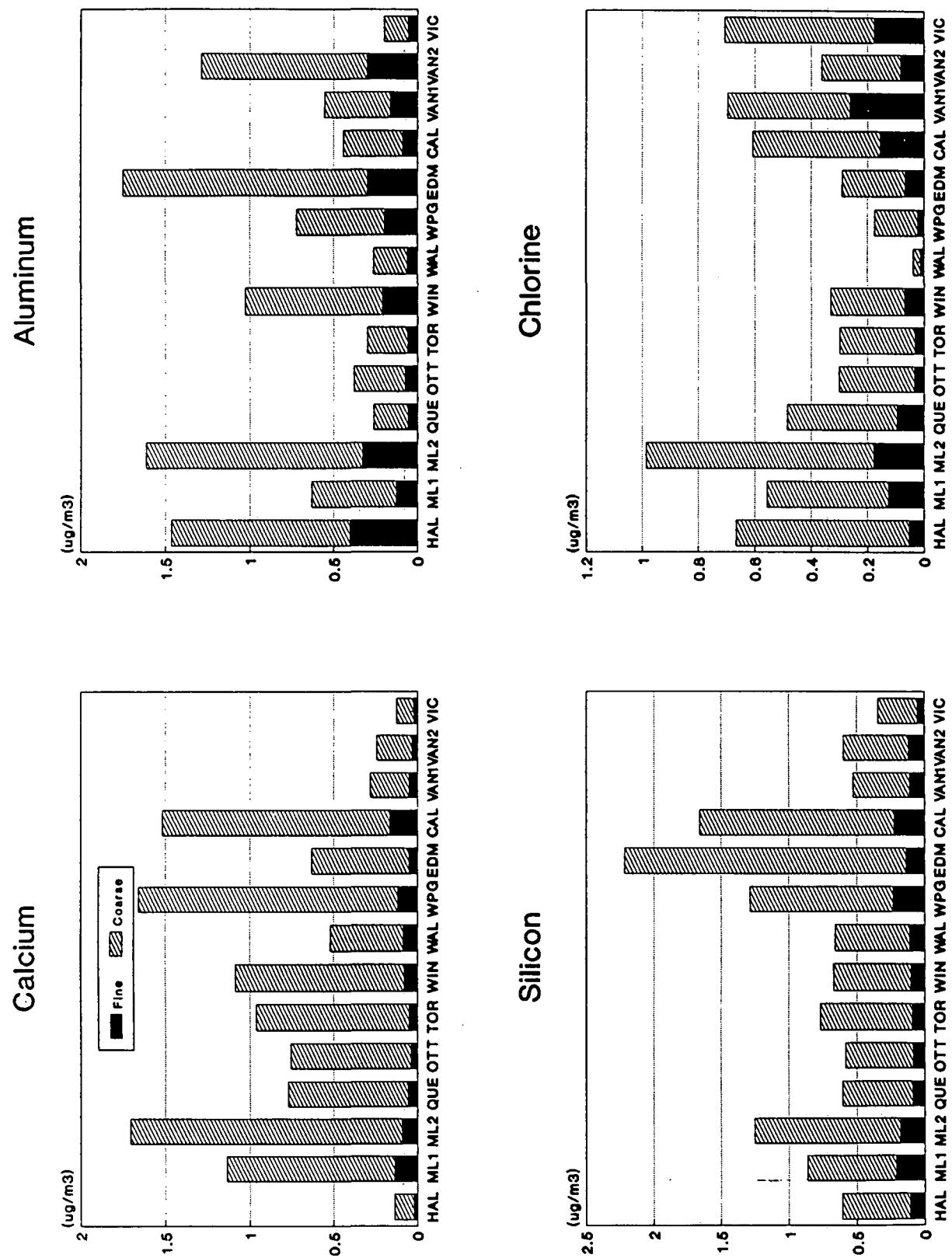


Figure 3: Mean Concentrations ($\mu\text{g}/\text{m}^3$) of Selected Elements by City

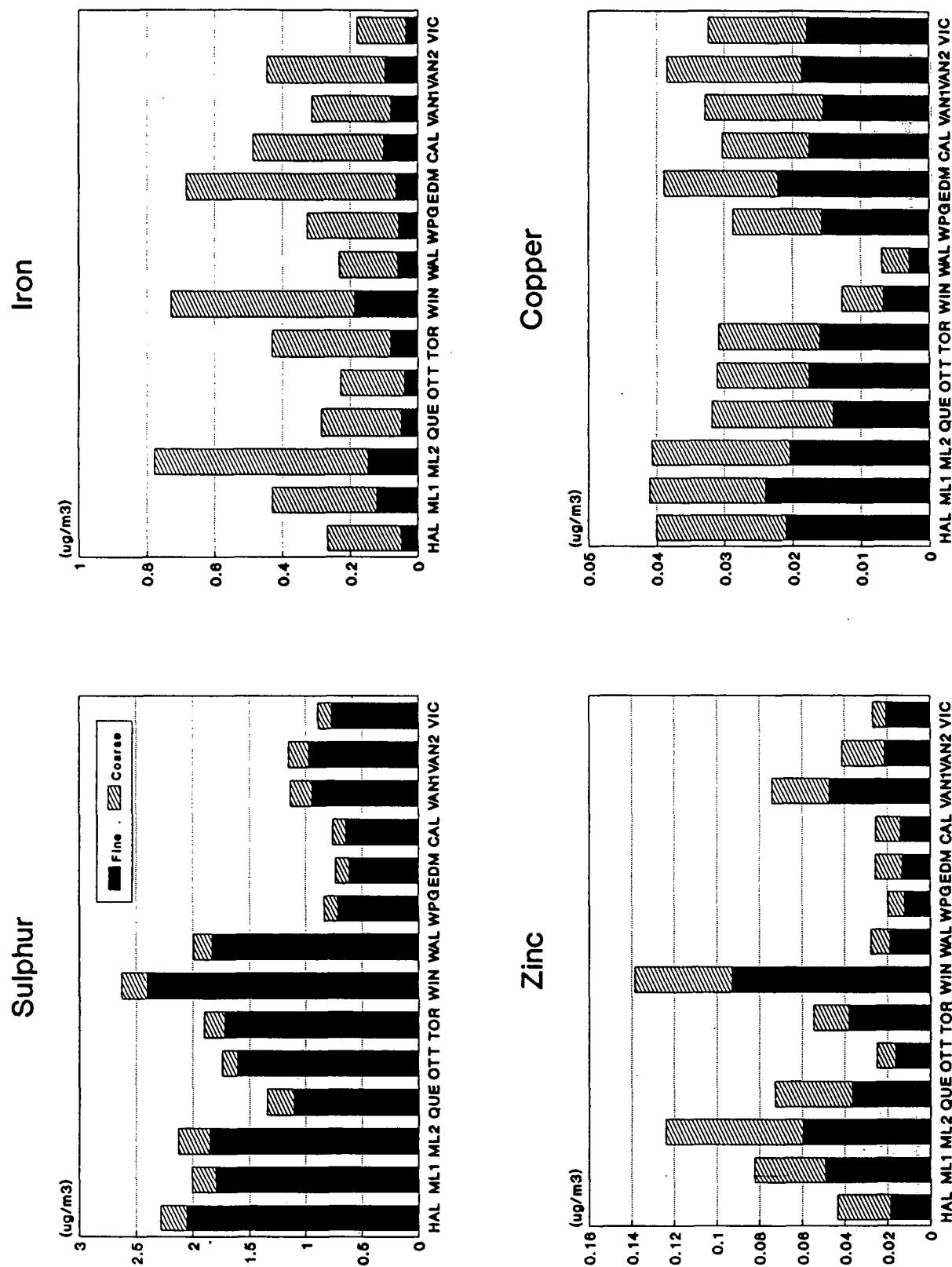
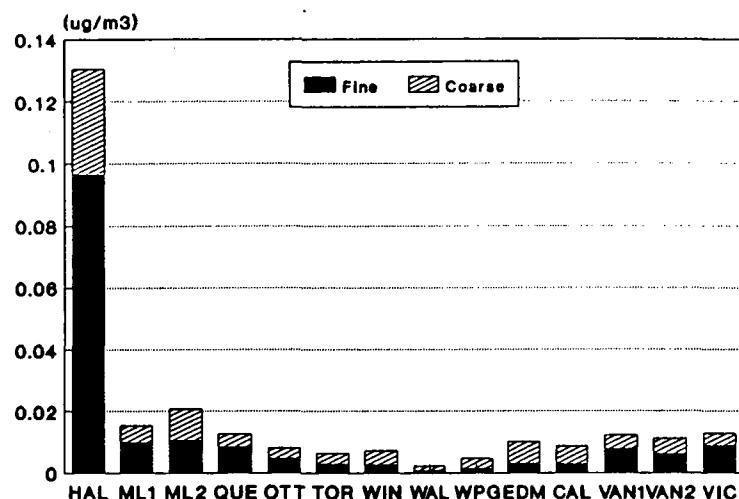
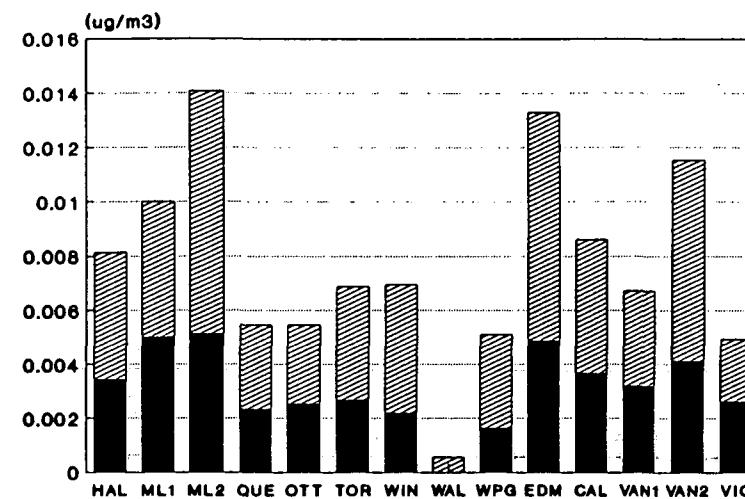
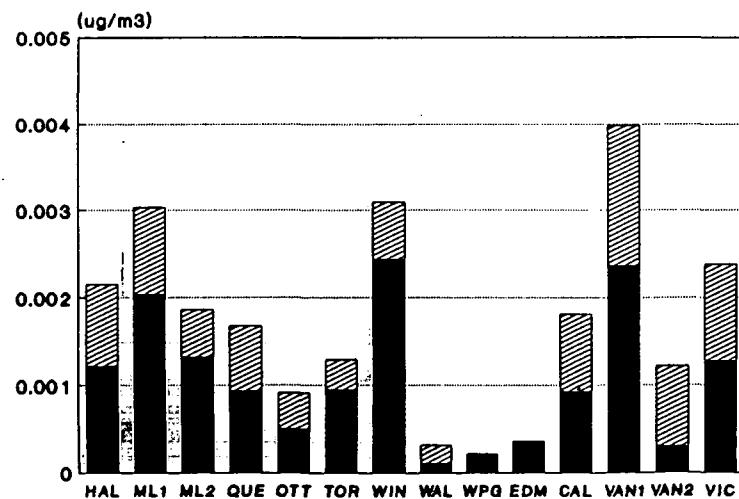
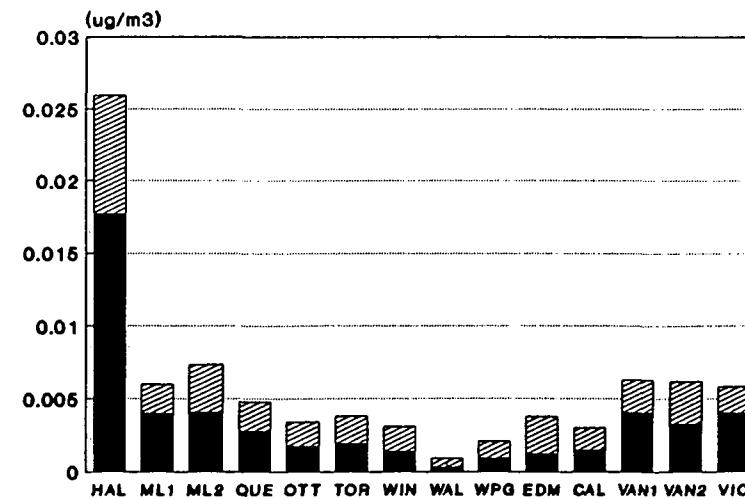


Figure 4: Mean Concentrations ($\mu\text{g}/\text{m}^3$) of Selected Elements by City

Vanadium**Chromium****Cadmium****Nickel****Figure 5: Mean Concentrations ($\mu\text{g}/\text{m}^3$) of Selected Elements by City**

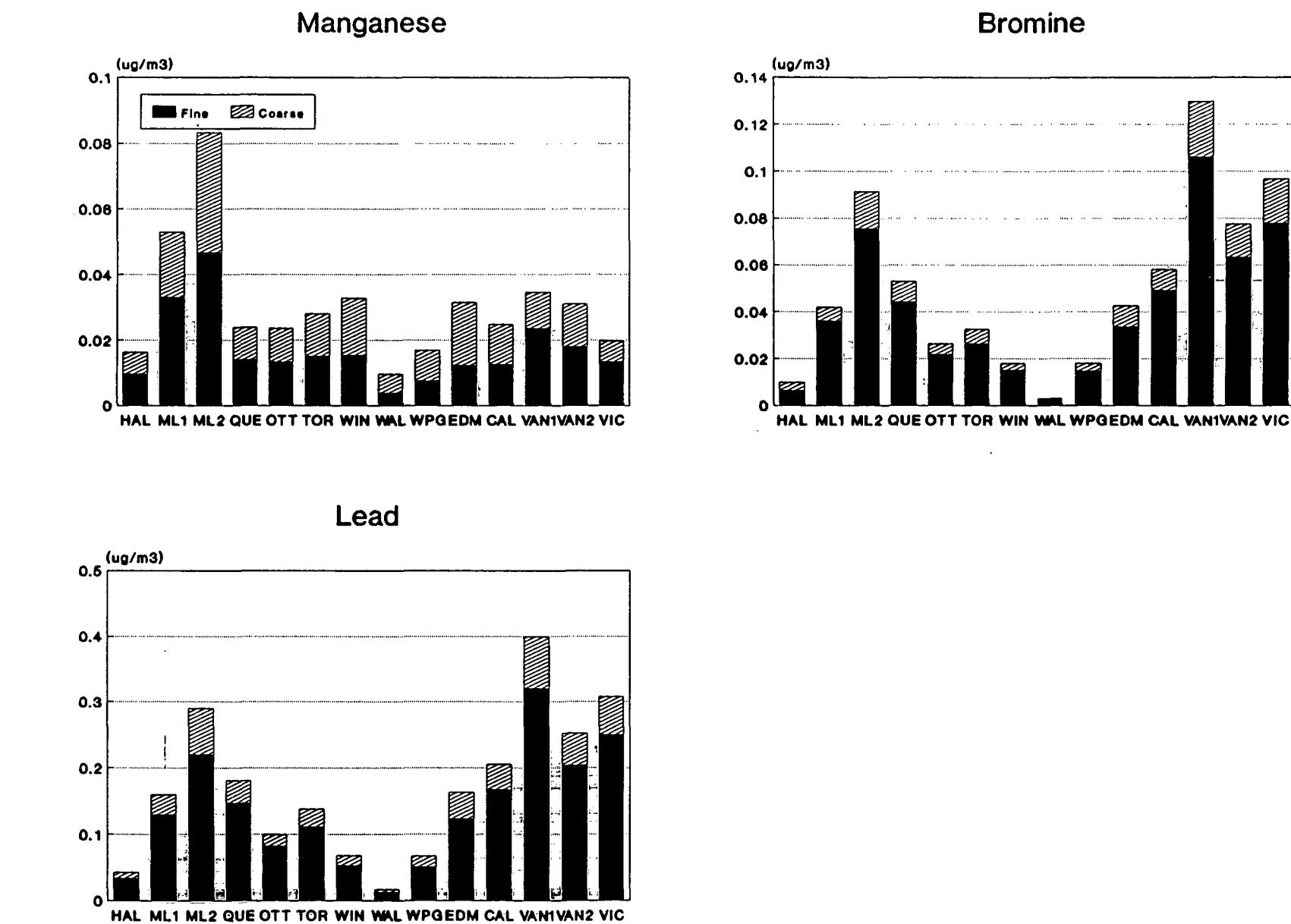


Figure 6: Mean Concentrations ($\mu\text{g}/\text{m}^3$) of Selected Elements by City

present as sulphate then the ratio of sulphates to sulphur would be 3.0. Using sulphur vs sulphate data for all dichotomous samples submitted for ion chromatography and EDXRF analysis the equation was:

$$SO_4 = 2.5 S - 0.5 \quad r = 0.935$$

Based on this equation, at least 15% of total sulphur is present in forms other than soluble sulphate.

A number of elements such as zinc, copper, chromium, nickel and manganese were found in significant amounts in both the fine and coarse fractions of PM₁₀. Copper concentrations are probably affected by copper emissions from the motors of co-located hi-vol samplers. At the Windsor site, hi-vol exhausts are ducted 10 m away from the dichotomous sampler; this site had by far the lowest copper levels of the urban sites.

Lead concentrations have decreased significantly at most monitoring sites due to a phaseout of leaded gasoline. Because leaded gasoline contains tetraethyl lead with a fixed bromine and lead content, bromine/lead ratios can be used as an indicator of automotive emission contributions to measured lead levels at monitoring sites.¹⁴ The expected bromine/lead ratio in tailpipe emissions from automobiles using leaded gasoline is approximately 0.35. Because bromine is more volatile than lead, ambient measurements of automobile derived particulates generally show lower bromine/lead ratios. Table 14 provides a summary of Br/Pb ratios at dichotomous sampler sites. The ratios were very consistent ranging from 0.23 to 0.30, but were lower than ratios measured in the period 1984 to 1986 which ranged from 0.3 to 0.4 at the same sites. This suggests that the automobile is still the major contributor to measured lead levels but its percentage contribution is decreasing.

5.3 Comparison of Dichotomous Sampler and SSI Hi-Vol

As previously noted, the SA 321 inlet used on the SSI hi-vols until January 1989 would be expected to overcollect coarse particulate matter. At two sites, Ottawa and Edmonton, co-located SSI and dichotomous samplers were operated. Table 15 presents a comparison of mass measurements made with the two types of PM₁₀ samplers, the mean ratio of the SSI hi-vol sampler mass to the dichotomous sampler mass and the slope, intercept and correlation coefficient for the linear regression of SSI PM₁₀ vs dichotomous sampler PM₁₀ (one outlier was removed from each data set). Scatter plots of SSI hi-vol PM₁₀ vs dichotomous sampler PM₁₀ are given in Figures 8 and 9.

The Edmonton SSI vs dichotomous sampler plot shows a large amount of scatter, a poor correlation coefficient and a large positive intercept. There are many occurrences of very high SSI mass loadings with relatively low dichotomous sampler mass loadings. The mean SSI PM₁₀ concentration was 48 µg/m³ (Table 15) vs a mean dichotomous sampler PM₁₀ concentration of 37 µg/m³.

This difference of 30% is similar to that recorded at high particulate loading sites in the United States.⁶ Compared to other Canadian sites, the Edmonton site had high TSP and high coarse particulate loadings.

At the Ottawa site the SSI vs dichotomous sampler PM₁₀ plot shows less scatter and a corresponding improvement in correlation coefficient. Mean PM₁₀ concentrations measured by the two samplers were identical at 24 µg/m³. There were, however, a number of occurrences of large differences in PM₁₀ measured by the two samplers.

**Figure 7: Comparison of Sulphate and Sulphur Concentrations
Dichotomous Sampler Sites (1985-1987)**

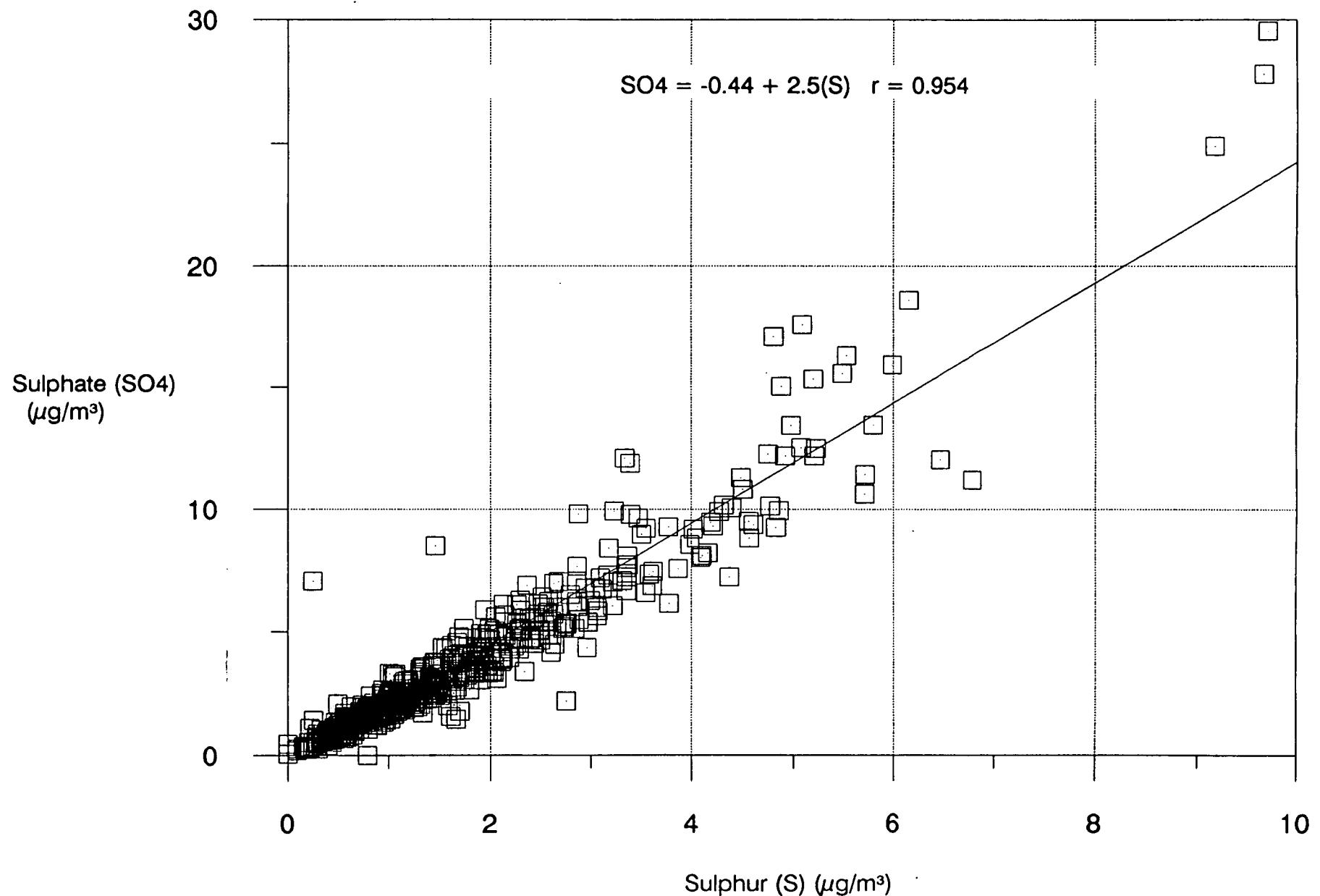
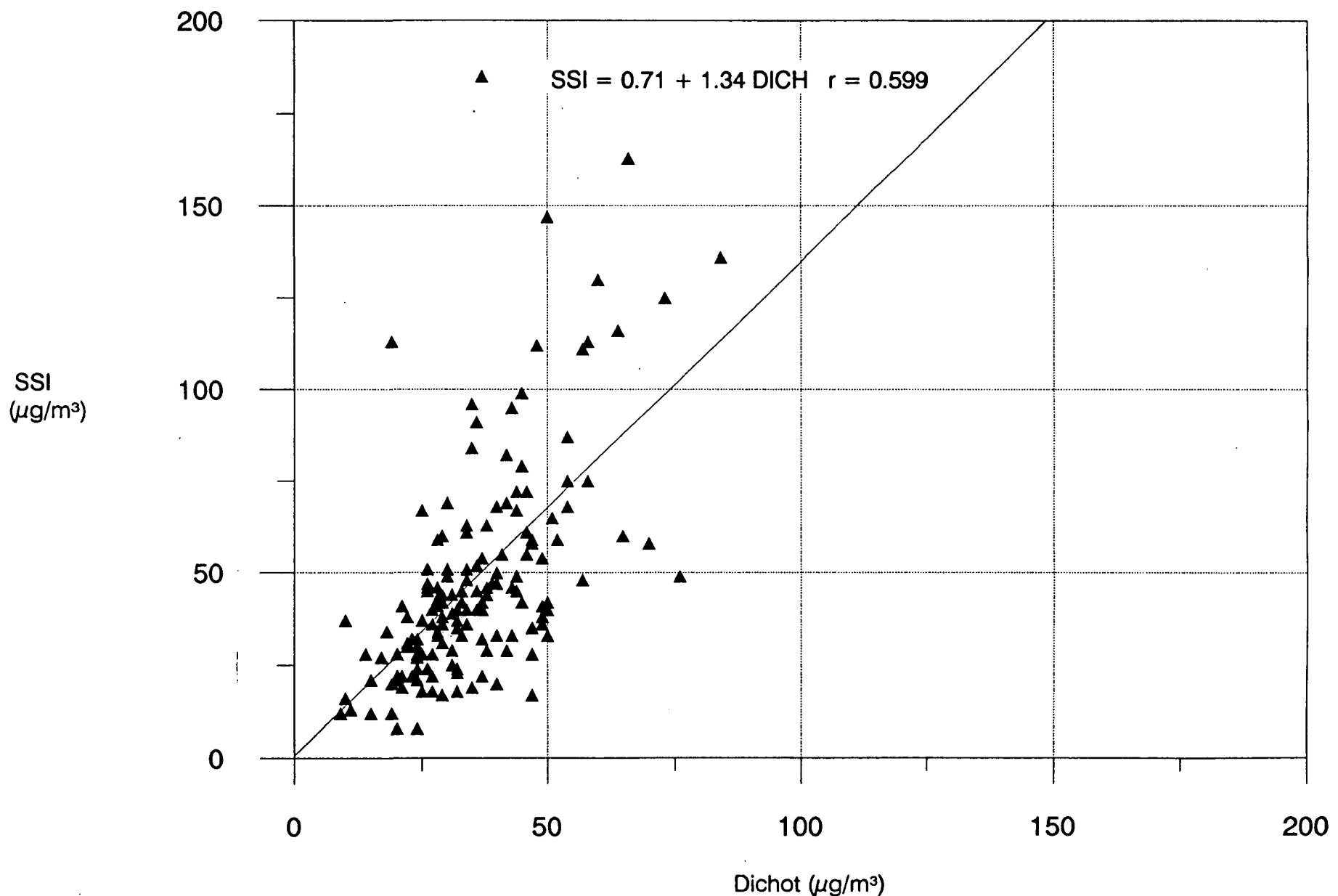


Table 14: Comparison of Bromine/Lead Ratios at Dichotomous Sampler Sites
(November 1985 - October 1988)

Station	City	No. of Samples	Mean Lead ($\mu\text{g}/\text{m}^3$)	Mean Bromine ($\mu\text{g}/\text{m}^3$)	Mean Br/Pb Ratio	Std. Dev. Ratio	Correlation Coefficient
30101	HALIFAX	50	0.04	0.01	0.27	0.12	0.76
50104	MONTREAL	56	0.16	0.04	0.25	0.07	0.94
50109	MONTREAL	40	0.29	0.09	0.30	0.09	0.81
50307	QUEBEC CITY	53	0.18	0.05	0.28	0.06	0.98
60104	OTTAWA	47	0.10	0.03	0.24	0.05	0.99
60417	TORONTO	41	0.14	0.03	0.23	0.05	0.91
70119	WINNIPEG	40	0.07	0.02	0.27	0.04	0.96
90130	EDMONTON	34	0.16	0.04	0.25	0.03	0.97
90204	CALGARY	49	0.21	0.06	0.26	0.06	0.99
00118	VANCOUVER	38	0.40	0.13	0.30	0.04	0.99
00111	VANCOUVER	68	0.25	0.08	0.27	0.06	0.98
00303	VICTORIA	54	0.31	0.10	0.30	0.04	0.99
60204	WINDSOR	67	0.07	0.02	0.26	0.14	0.65
61901	WALPOLE ISLAND	23	0.02	0.00	0.23	0.14	0.03

**Figure 8: Comparison of SSI Hi-Vol vs Dichotomous Sampler PM10
Edmonton**



**Figure 9: Comparison of SSI Hi-vol PM10 vs Dichotomous Sampler PM10
Ottawa**

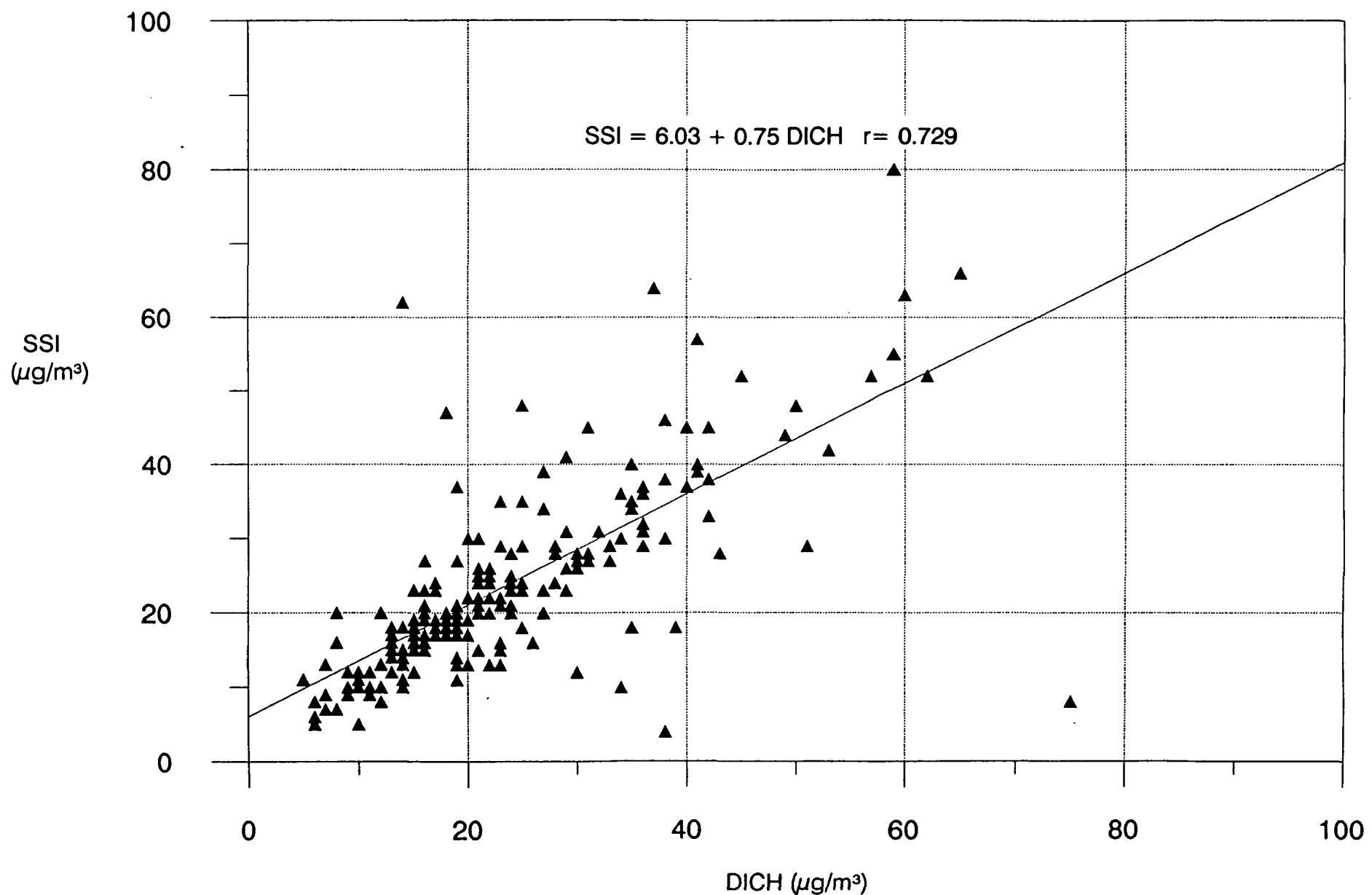


TABLE 15 - COMPARISON OF DICHOTOMOUS SAMPLER PM₁₀ AND SSI HI-VOL PM₁₀
 (May 6, 1984 - December 29, 1987)

Station No.	City	No. of Samples	Mean Dichot PM ₁₀ ($\mu\text{g}/\text{m}^3$)	Mean SSI PM ₁₀ ($\mu\text{g}/\text{m}^3$)	Mean Ratio SSI/Dich	Std. Dev. Ratio	Slope	Intercept	Corr. Coeff.
60104	Ottawa	201	24	24	1.06	0.41	0.85	4.0	0.792
90130	Edmonton	156	37	48	1.35	0.75	0.84	17.3	0.459

It is difficult to estimate how large an impact the SA 321 inlet's overcollection problem had on PM₁₀ loadings measured at the other SSI sites (Sydney, Saint John, Regina). An examination of data collected since the changeover to the SA 1200 inlet leads will be required.

5.4 Relationships between PM₁₀ and TSP

The intercomparison of PM₁₀ and hi-vol total suspended particulates (TSP) data is important for the determination of relationships that could allow historical TSP data to be interpreted in terms of any proposed 10 μm inhalable particulate matter air quality objective.

There are many factors, however, that influence the relationships between PM₁₀ and TSP including (a) the variation in particle size collection efficiency of the hi-vol with varying wind speed and direction;⁷ (b) artifact nitrate and sulphate formation on hi-vol filter media; (c) differences in mass measurement techniques used by the different agencies and (d) particulate losses during sample handling and sample shipment.

Table 16 contains a comparison of PM₁₀ and TSP mass data at each site. Shown in the table are mean concentrations of PM₁₀ and TSP, the mean ratio of PM₁₀ to TSP and the standard deviation of the ratios. Only days for which both TSP and PM₁₀ data were available are included in the summary.

Since hi-vols typically collect a larger size range of ambient particulate matter than do SSI or dichotomous samplers, mean PM₁₀/TSP ratios of less than unity would be expected. Only one site, St. John's had a ratio greater than 1.0. This site also had the lowest mean PM₁₀ and TSP loadings. Two sites, Halifax and Vancouver Rocky Point Park, had ratios greater than 0.80; for all other sites the mean ratios fell into the range of 0.41 to 0.78. In Figure 10, the ratio of PM₁₀ to TSP is plotted for different TSP ranges using 24 h data from all sites. The data used in the plot is contained in Table 17. It is clear that the ratio tends to decrease as TSP increases, the 24 h data was best fitted by a log equation as shown in the figure.

The ratio of mean PM₁₀ to mean TSP (1984-1987) was plotted vs mean TSP for all sites as shown in Figure 11. This data was also best fit by a log equation. Using the equations from Figure 9 for 24 h data and the equation from Figure 10 for annual data, the existing ambient air quality objectives for TSP can be translated to PM₁₀ as shown in Table 18. Since there were few data points at high concentrations, the adequacy of the derived equations is questionable for high TSP loadings (ie. equal to or greater than the tolerable). It should be noted that air quality objectives are best set based on specific health studies relating effects to specific PM₁₀ measurements; unfortunately, at this time little such information exists.

**Table 16: Comparison of PM10 and TSP (Mass)
(May 1984 - December 1987)**

Station Number	City	SSI(S) Dichot(D)	No. of Samples	Mean PM10 ($\mu\text{g}/\text{m}^3$)	Mean TSP ($\mu\text{g}/\text{m}^3$)	Mean Ratio PM10/TSP	Std. Dev. Ratio
10101	ST. JOHNS	D	35	17	18	1.25	0.85
30101	HALIFAX	D	156	30	35	0.90	0.38
30311	SYDNEY	S	166	36	60	0.63	0.30
40201	SAINT JOHN	S	183	24	39	0.67	0.29
50104	MONTREAL	D	194	35	57	0.68	0.54
50109	MONTRÉAL	D	138	49	111	0.49	0.24
50307	QUEBEC CITY	D	57	21	46	0.48	0.16
60104	OTTAWA	D	208	23	40	0.59	0.21
60417	TORONTO	D	159	28	55	0.53	0.21
60204	WINDSOR	D	20	37	69	0.53	0.18
70119	WINNIPEG	D	163	31	70	0.54	0.30
80110	REGINA	S	190	37	57	0.78	0.49
90130	EDMONTON	D	165	36	90	0.48	0.25
90204	CALGARY	D	185	32	86	0.41	0.21
00118	VANCOUVER	D	108	27	38	0.71	0.19
00111	VANCOUVER	D	155	31	40	0.81	0.28
00303	VICTORIA	D	113	21	39	0.55	0.27
60104	OTTAWA	S	207	24	40	0.60	0.22
90130	EDMONTON	S	195	46	80	0.63	0.32

**Figure 10:PM10/TSP Ratio vs TSP Concentrations
(All 24 h Data 1984-1987)**

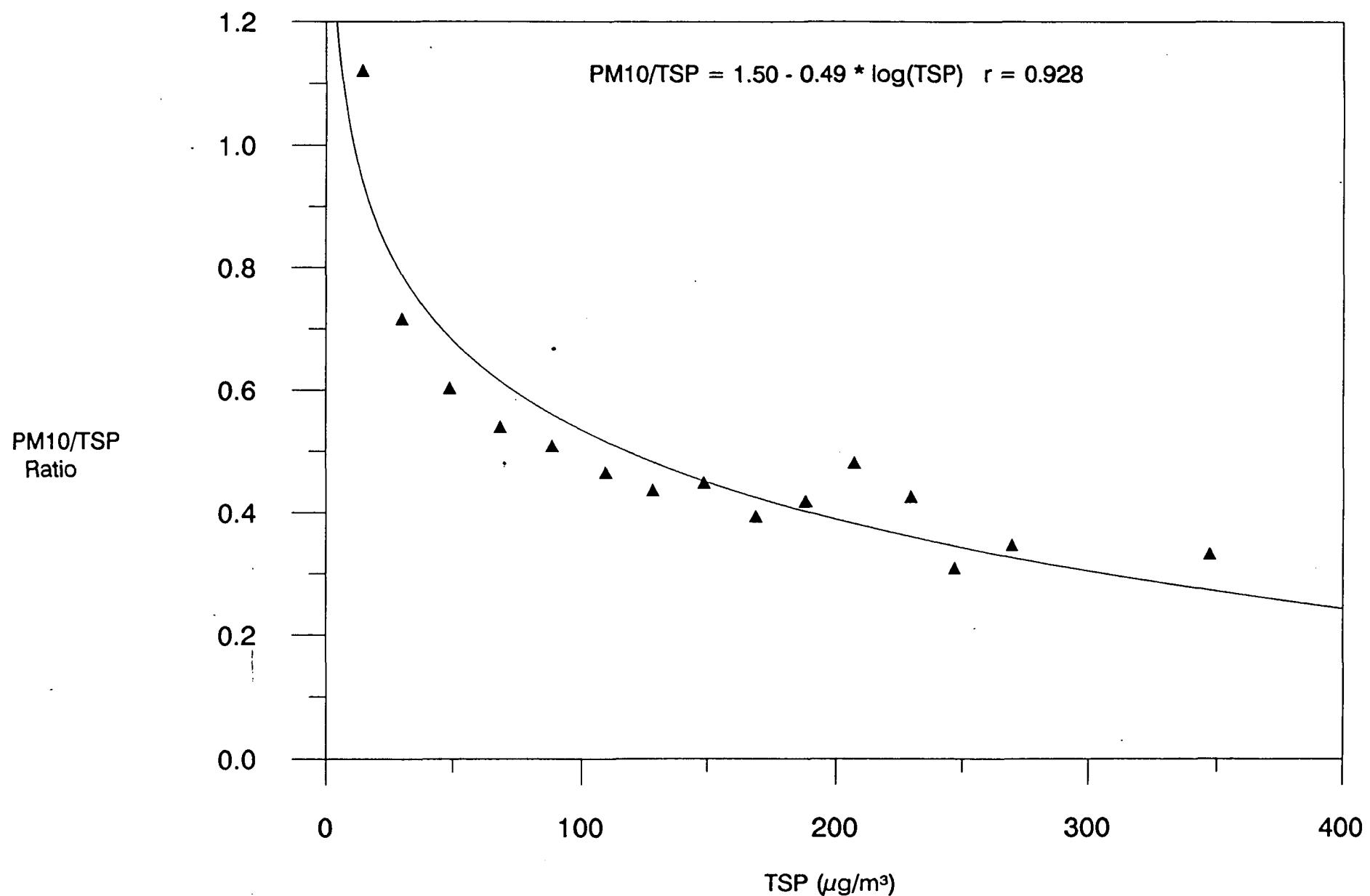


Table 17: Mean PM10/TSP Ratio by TSP Range

TSP Range ($\mu\text{g}/\text{m}^3$)	No. of Samples	Mean TSP ($\mu\text{g}/\text{m}^3$)	Mean PM10 ($\mu\text{g}/\text{m}^3$)	Mean PM10/TSP Ratio
0 - 19	173	14.5	14.9	1.12
20 - 39	794	30.1	21.3	0.72
40 - 59	659	48.7	29.4	0.60
60 - 79	361	68.6	37.0	0.54
80 - 99	181	88.7	44.9	0.51
100 - 119	113	109.5	51.0	0.47
120 - 139	69	128.6	56.0	0.44
140 - 159	24	148.7	66.7	0.45
160 - 179	33	169.0	66.7	0.39
180 - 199	14	188.2	78.9	0.42
200 - 219	10	207.1	99.5	0.48
220 - 239	10	229.1	97.4	0.43
240 - 259	5	246.8	76.4	0.31
260 - 279	3	270.0	93.3	0.35
280 - 439	6	347.0	109.7	0.33

**Figure 11 : Mean PM10/TSP Ratio vs Mean TSP
(1984-1987 All Sites)**

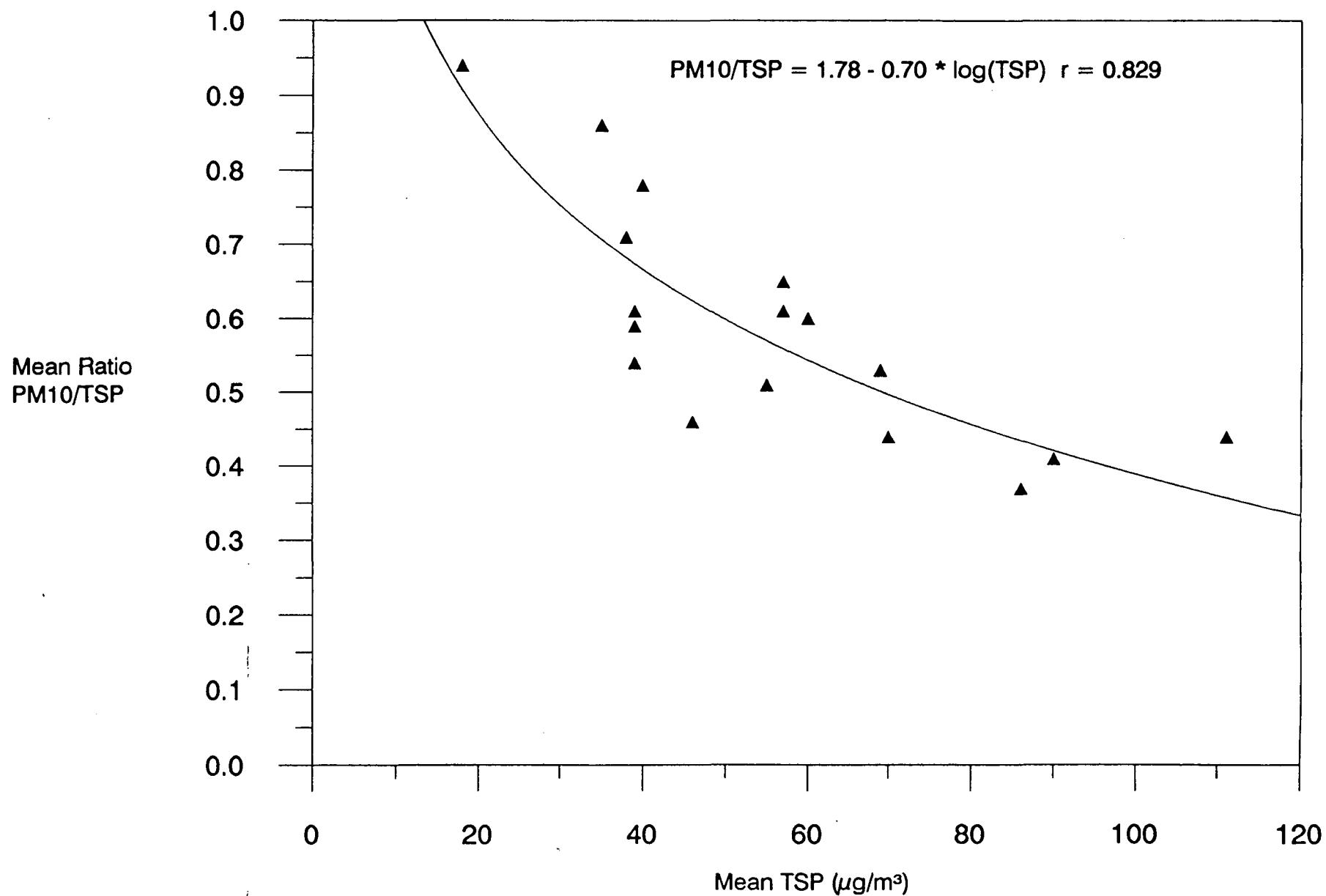


TABLE 18 - CONVERSION of EXISTING TSP AQO to PM₁₀ EQUIVALENT

AQO Definition	Avg Time	TSP ($\mu\text{g}/\text{m}^3$)	PM ₁₀ ($\mu\text{g}/\text{m}^3$)
Acceptable	24h	120	60
	Annual	70	35
Tolerable	24h	400	90

A comparison of sulphate levels measured on the dichotomous sampler and SSI hi-vols to that measured by the standard hi-vols is given in *Table 19*. The Toronto and Windsor sites had the largest mean sulphate differences due primarily to the fact that the hi-vols at these two sites used glass fibre hi-vol filter media which is known to result in a large sulphate artifact. For all sites, except Edmonton (SSI) and St. John's, the PM₁₀ sulphate measurement was lower than the hi-vol sulphate measurement.

A similar analysis of PM₁₀ sampler nitrate measurement vs hi-vol nitrate measurements is provided in *Table 20*. Particulate nitrate concentrations were quite low and mean differences between PM₁₀ samplers and hi-vol samplers are correspondingly small. The largest differences were again at the Toronto and Windsor sites. As discussed in Section 5.2.3, particulate nitrates can be lost by volatilization from teflon filters in low flow samplers such as the dichotomous sampler. It is a matter of debate on how closely nitrate measurements made by either PM₁₀ or hi-vol samplers using low artifact filter media approximately true ambient particulate nitrate concentrations.

In *Table 21*, a comparison of lead measurements made with the PM₁₀ sampler vs the hi-vol sampler is provided. At all sites, except Regina and St. John's, the mean PM₁₀ lead concentrations were lower than the corresponding hi-vol lead measurements, although mean differences were

small. Dichotomous sampler lead data are reported to one more significant digit than are hi-vol lead measurements. Because of the very low lead levels now measured at most sites, the dichotomous sampler lead data should be more accurate than the hi-vol lead data. As shown in *Table 2*, a number of agencies perform lead analyses on the hi-vol filter while all dichotomous sampler lead analyses were performed by CD, Ottawa. Based on data in *Table 21*, there is good correspondence between Canadian labs carrying out lead analyses.

6. CURRENT and FUTURE ACTIVITIES

Sampling is continuing at all the dichotomous sampler and SSI sites noted in *Table 1*. Additional SSI samplers have been installed in five cities in Ontario (Toronto, Hamilton, Windsor, Sault Ste. Marie and Thunder Bay) and at one city in Saskatchewan (Saskatoon). PMD plans to add four or five additional SSI samplers to the network in 1990/91. A large scale expansion of the PM₁₀ sampling network is not planned at this time due to the uncertainties related to the revision of particulate matter national ambient air quality objectives. The Federal Provincial Advisory Committee on Air Quality (FPACAQ) Sub-committee on Air Quality Objectives recently indicated that a PM₁₀ standard could not be set at this time. It also noted that 10 μm particulates may not necessarily be the size fraction of most interest. It is likely that the development of a revised particulate matter air quality objective by this committee will take another one to two years.

**Table 19: Comparison of PM10 and TSP (SO₄)
(May 1984 - December 1987)**

Station Number	City	SIS(S) Dich(D)	No. of Samples	Mean PM10 ($\mu\text{g}/\text{m}^3$)	Mean TSP ($\mu\text{g}/\text{m}^3$)	Mean Ratio PM10/TSP	Std. Dev. Ratio
10101	ST. JOHN'S	D	33	2.8	2.5	1.65	1.32
30101	HALIFAX	D	163	5.5	6.2	0.87	0.29
30311	SYDNEY	S	171	4.3	4.7	0.96	0.41
40201	SAINT JOHN	S	183	5.1	5.3	1.06	0.59
50104	MONTRÉAL	D	173	4.6	5.3	1.03	0.95
50109	MONTRÉAL	D	129	4.8	4.8	1.19	1.02
50307	QUEBEC CITY	D	65	2.9	4.4	0.76	0.80
60104	OTTAWA	D	204	3.9	5.2	0.76	0.26
60417	TORONTO	D	150	5.0	9.1	0.55	0.47
60204	WINDSOR	D	21	7.2	15.2	0.42	0.19
70119	WINNIPEG	D	164	1.9	2.4	0.83	0.31
80110	REGINA	S	176	2.3	2.3	1.01	0.30
90130	EDMONTON	D	147	1.7	2.4	0.72	0.72
90204	CALGARY	D	166	1.9	2.6	0.82	0.37
00118	VANCOUVER	D	107	2.6	3.4	0.77	0.26
00111	VANCOUVER	D	147	2.4	3.5	0.70	0.31
00303	VICTORIA	D	113	2.2	3.9	0.58	0.31
60104	OTTAWA	S	211	4.7	5.2	0.90	0.27
90130	EDMONTON	S	166	2.9	2.3	1.83	1.06

Table 20: Comparison of PM10 and TSP (NO3)
(May 1984 - December 1987)

Station No.	City	SSI(S) Dich(D)	No. of Samples	Mean PM10 NO3 ($\mu\text{g}/\text{m}^3$)	Mean TSP NO3 ($\mu\text{g}/\text{m}^3$)	Mean Ratio PM10/TSP	Std. Dev. Ratio
10101	ST. JOHN'S	D	34	0.4	0.4	1.11	0.70
30101	HALIFAX	D	163	0.6	0.7	1.13	1.33
30311	SYDNEY	S	170	0.6	0.5	1.35	0.72
40201	SAINT JOHN	S	183	0.8	0.8	1.19	0.97
50104	MONTREAL	D	173	1.5	2.0	1.13	3.37
50109	MONTREAL	D	128	1.6	1.8	1.16	1.54
50307	QUEBEC CITY	D	65	0.9	1.6	0.66	0.64
60104	OTTAWA	D	202	0.9	1.1	1.08	1.21
60417	TORONTO	D	150	1.7	4.3	0.51	0.60
60204	WINDSOR	D	21	1.4	4.7	0.42	0.61
70119	WINNIPEG	D	163	0.7	1.3	0.97	1.61
80110	REGINA	S	176	0.8	0.8	1.15	0.64
90130	EDMONTON	D	147	1.0	1.2	1.03	1.04
90204	CALGARY	D	166	1.0	1.3	0.82	0.72
00118	VANCOUVER	D	107	1.1	1.2	1.14	0.85
00111	VANCOUVER	D	150	1.0	1.1	1.11	0.81
00303	VICTORIA	D	113	0.9	1.1	0.97	0.85
60104	OTTAWA	S	212	0.8	1.0	0.94	0.77
90130	EDMONTON	S	166	1.2	1.2	1.92	8.13

**Table 21: Comparison of PM10 and TSP (Pb)
(May 1984 - December 1987)**

Station No.	City	SSI(S) Dichot(D)	No. of Samples	Mean PM10 Pb ($\mu\text{g}/\text{m}^3$)	Mean TSP Pb ($\mu\text{g}/\text{m}^3$)	Mean Ratio PM10/TSP	Std. Dev. Ratio
10101	ST. JOHN'S	D	28	0.11	0.09	1.01	0.72
30101	HALIFAX	D	86	0.05	0.07	0.64	0.37
30311	SYDNEY	S	171	0.14	0.15	0.84	0.42
40201	SAINT JOHN	S	183	0.07	0.09	0.76	0.59
50104	MONTRÉAL	D	89	0.26	0.37	0.77	0.55
50109	MONTRÉAL	D	54	0.54	0.67	0.88	0.65
50307	QUEBEC CITY	D	37	0.23	0.28	0.88	0.37
60104	OTTAWA	D	106	0.12	0.17	0.65	0.25
60417	TORONTO	D	74	0.20	0.25	0.85	0.53
70119	WINNIPEG	D	65	0.11	0.19	0.69	0.68
80110	REGINA	S	194	0.23	0.22	1.00	0.50
90130	EDMONTON	D	97	0.27	0.35	0.79	0.27
90204	CALGARY	D	82	0.28	0.37	0.68	0.16
00118	VANCOUVER	D	54	0.36	0.43	0.85	0.28
00111	VANCOUVER	D	65	0.35	0.41	0.83	0.20
00303	VICTORIA	D	33	0.30	0.36	0.81	0.20
60104	OTTAWA	S	212	0.12	0.14	0.85	0.40
90130	EDMONTON	S	201	0.25	0.29	0.87	0.28

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APPENDIX A

MEAN CONCENTRATIONS of ELEMENTS MEASURED by EDXRF

Table A1 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Mass

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	13	13	26	1.16	0.57
50104	MONTREAL	54	12	19	32	1.89	1.36
50109	MONTREAL	40	26	22	48	0.89	0.47
50307	QUEBEC CITY	53	11	13	24	1.76	1.96
60104	OTTAWA	47	10	14	24	1.93	1.73
60417	TORONTO	39	12	15	27	1.58	1.23
70119	WINNIPEG	40	19	11	30	1.04	1.12
90130	EDMONTON	34	22	12	33	0.73	0.88
90204	CALGARY	49	17	12	29	0.87	0.72
00118	VANCOUVER	38	11	18	30	1.66	0.89
00111	VANCOUVER	68	17	15	32	1.24	0.91
00303	VICTORIA	54	7	14	21	2.29	1.55
60204	WINDSOR	67	16	21	37	1.37	0.64
61901	WALPOLE ISLAND	23	11	16	27	1.79	1.11

Table A2 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Sulphate (SO₄)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.4	4.4	4.8	14.85	22.52
50104	MONTREAL	56	0.5	4.0	4.5	11.28	11.71
50109	MONTREAL	39	0.5	4.4	4.9	17.71	42.98
50307	QUEBEC CITY	51	0.4	2.4	2.8	8.28	7.40
60104	OTTAWA	46	0.3	3.6	3.9	15.28	18.18
60417	TORONTO	39	0.4	3.7	4.1	11.39	5.52
70119	WINNIPEG	40	0.3	1.4	1.7	6.94	5.25
90130	EDMONTON	34	0.2	1.3	1.5	6.67	7.01
90204	CALGARY	49	0.3	1.3	1.6	6.65	10.60
00118	VANCOUVER	37	0.3	2.0	2.3	7.80	4.37
00111	VANCOUVER	65	0.3	1.8	2.1	6.84	4.31
00303	VICTORIA	54	0.3	1.7	2.0	6.99	4.75
60204	WINDSOR	67	0.4	6.2	6.7	14.44	13.56
61901	WALPOLE ISLAND	23	0.3	4.4	4.7	14.07	7.49

Table A3 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Nitrate (NO₃)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.4	0.3	0.7	1.02	0.60
50104	MONTREAL	56	0.5	1.4	1.9	3.97	7.79
50109	MONTREAL	39	0.5	0.8	1.4	1.78	2.45
50307	QUEBEC CITY	51	0.4	0.6	1.0	1.68	1.05
60104	OTTAWA	46	0.5	0.8	1.3	1.48	1.93
60417	TORONTO	39	0.6	1.1	1.6	1.92	2.82
70119	WINNIPEG	40	0.3	0.4	0.8	1.63	2.08
90130	EDMONTON	34	0.3	0.5	0.8	1.72	1.72
90204	CALGARY	49	0.3	0.8	1.1	2.28	2.77
00118	VANCOUVER	37	0.5	0.7	1.2	1.57	1.62
00111	VANCOUVER	65	0.5	0.4	0.9	1.09	0.98
00303	VICTORIA	54	0.4	0.5	0.9	1.60	1.44
60204	WINDSOR	67	0.6	0.7	1.2	1.54	1.88
61901	WALPOLE ISLAND	23	0.4	0.2	0.6	0.77	0.69

Table A4 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Aluminum (Al)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	1.062	0.404	1.465	0.49	1.13
50104	MONTREAL	56	0.502	0.128	0.630	0.34	0.29
50109	MONTREAL	40	1.284	0.330	1.614	0.23	0.10
50307	QUEBEC CITY	53	0.204	0.057	0.261	0.70	0.92
60104	OTTAWA	47	0.307	0.073	0.379	0.45	0.45
60417	TORONTO	41	0.240	0.060	0.300	0.38	0.42
70119	WINNIPEG	40	0.526	0.195	0.721	0.39	0.38
90130	EDMONTON	34	1.451	0.298	1.750	0.18	0.10
90204	CALGARY	49	0.354	0.089	0.443	0.30	0.24
00118	VANCOUVER	38	0.396	0.159	0.555	0.50	0.29
00111	VANCOUVER	68	0.983	0.303	1.286	0.42	0.42
00303	VICTORIA	54	0.141	0.056	0.197	0.56	0.88
60204	WINDSOR	67	0.818	0.209	1.027	0.23	0.29
61901	WALPOLE ISLAND	23	0.203	0.056	0.259	0.25	0.30

Table A5 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Silicon (Si)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.499	0.108	0.606	0.36	0.32
50104	MONTREAL	56	0.653	0.211	0.864	0.47	0.38
50109	MONTREAL	40	1.073	0.180	1.253	0.18	0.10
50307	QUEBEC CITY	53	0.515	0.088	0.603	0.37	0.53
60104	OTTAWA	47	0.497	0.084	0.581	0.31	0.34
60417	TORONTO	41	0.675	0.093	0.768	0.18	0.11
70119	WINNIPEG	40	1.054	0.232	1.286	0.35	0.38
90130	EDMONTON	34	2.076	0.136	2.212	0.08	0.06
90204	CALGARY	49	1.432	0.225	1.657	0.16	0.06
00118	VANCOUVER	38	0.424	0.101	0.526	0.27	0.15
00111	VANCOUVER	68	0.478	0.119	0.596	0.36	0.59
00303	VICTORIA	54	0.289	0.050	0.339	0.27	0.92
60204	WINDSOR	67	0.568	0.101	0.669	0.23	0.25
61901	WALPOLE ISLAND	23	0.569	0.089	0.658	0.42	0.67

Table A6 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Phosphorus (P)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.011	0.032	0.043	5.41	6.23
50104	MONTREAL	56	0.024	0.069	0.093	3.19	2.95
50109	MONTREAL	40	0.032	0.061	0.094	2.73	3.36
50307	QUEBEC CITY	53	0.014	0.026	0.041	7.22	25.15
60104	OTTAWA	47	0.015	0.031	0.046	3.59	4.22
60417	TORONTO	41	0.016	0.027	0.042	2.75	2.51
70119	WINNIPEG	40	0.018	0.011	0.029	0.83	1.11
90130	EDMONTON	34	0.017	0.011	0.028	0.88	1.35
90204	CALGARY	49	0.029	0.025	0.054	1.06	0.77
00118	VANCOUVER	38	0.016	0.022	0.039	2.15	2.15
00111	VANCOUVER	68	0.014	0.020	0.034	2.58	4.69
00303	VICTORIA	54	0.007	0.016	0.024	2.80	3.57
60204	WINDSOR	67	0.015	0.032	0.047	3.14	3.62
61901	WALPOLE ISLAND	23	0.009	0.020	0.030	1.87	1.79

Table A7 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Sulphur (S)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.225	2.057	2.282	11.77	14.22
50104	MONTREAL	56	0.208	1.799	2.006	10.15	6.13
50109	MONTREAL	40	0.277	1.851	2.128	7.41	4.61
50307	QUEBEC CITY	53	0.226	1.120	1.345	7.18	6.61
60104	OTTAWA	47	0.135	1.606	1.741	14.84	12.97
60417	TORONTO	41	0.179	1.720	1.899	12.97	8.45
70119	WINNIPEG	40	0.122	0.714	0.836	20.65	69.61
90130	EDMONTON	34	0.120	0.615	0.735	5.47	3.53
90204	CALGARY	49	0.117	0.643	0.760	6.59	5.13
00118	VANCOUVER	38	0.149	0.985	1.134	8.94	7.61
00111	VANCOUVER	68	0.177	0.974	1.151	7.84	6.58
00303	VICTORIA	54	0.121	0.768	0.889	7.23	4.87
60204	WINDSOR	67	0.223	2.404	2.627	14.01	11.21
61901	WALPOLE ISLAND	23	0.119	1.872	1.991	17.03	9.94

Table A8 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Chlorine (Cl)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.613	0.053	0.666	0.11	0.13
50104	MONTRÉAL	56	0.429	0.126	0.554	0.48	0.56
50109	MONTRÉAL	40	0.808	0.178	0.986	0.50	0.90
50307	QUEBEC CITY	53	0.389	0.095	0.484	0.90	2.52
60104	OTTAWA	47	0.268	0.033	0.301	0.29	0.38
60417	TORONTO	41	0.266	0.032	0.299	0.42	0.72
70119	WINNIPEG	40	0.153	0.021	0.174	0.39	0.57
90130	EDMONTON	34	0.222	0.067	0.289	0.41	0.53
90204	CALGARY	49	0.451	0.155	0.606	0.43	0.60
00118	VANCOUVER	38	0.453	0.243	0.697	1.02	1.58
00111	VANCOUVER	68	0.280	0.082	0.363	0.38	0.55
00303	VICTORIA	54	0.531	0.176	0.706	1.98	6.17
60204	WINDSOR	67	0.261	0.070	0.330	0.32	0.63
61901	WALPOLE ISLAND	23	0.027	0.009	0.037	0.61	1.05

Table A9 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Potassium (K)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.073	0.038	0.111	0.80	0.80
50104	MONTREAL	56	0.102	0.095	0.197	1.47	1.38
50109	MONTREAL	40	0.181	0.107	0.289	0.80	0.88
50307	QUEBEC CITY	53	0.083	0.081	0.163	2.22	3.72
60104	OTTAWA	47	0.092	0.059	0.150	1.38	1.77
60417	TORONTO	41	0.086	0.063	0.148	1.26	1.24
70119	WINNIPEG	40	0.120	0.051	0.171	1.14	3.18
90130	EDMONTON	34	0.152	0.039	0.191	0.42	0.57
90204	CALGARY	49	0.126	0.052	0.178	0.49	0.33
00118	VANCOUVER	38	0.049	0.140	0.189	3.75	2.51
00111	VANCOUVER	68	0.048	0.079	0.128	2.63	3.46
00303	VICTORIA	54	0.035	0.071	0.105	2.28	2.44
60204	WINDSOR	67	0.111	0.135	0.246	1.53	1.88
61901	WALPOLE ISLAND	23	0.097	0.061	0.157	1.37	2.72

Table A10 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Calcium (Ca)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.116	0.020	0.136	0.26	0.35
50104	MONTREAL	56	0.999	0.136	1.135	0.17	0.08
50109	MONTREAL	40	1.616	0.091	1.707	0.26	1.18
50307	QUEBEC CITY	53	0.716	0.056	0.772	0.16	0.36
60104	OTTAWA	47	0.717	0.038	0.755	0.07	0.05
60417	TORONTO	41	0.913	0.049	0.962	0.08	0.07
70119	WINNIPEG	40	1.542	0.117	1.659	0.11	0.12
90130	EDMONTON	34	0.583	0.048	0.631	0.10	0.06
90204	CALGARY	49	1.353	0.165	1.518	0.13	0.04
00118	VANCOUVER	38	0.240	0.040	0.280	0.21	0.15
00111	VANCOUVER	68	0.210	0.031	0.241	0.26	1.11
00303	VICTORIA	54	0.102	0.020	0.123	0.27	0.83
60204	WINDSOR	67	1.006	0.078	1.084	0.08	0.05
61901	WALPOLE ISLAND	23	0.478	0.041	0.519	0.12	0.10

Table A11 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Scandium (Sc)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.002	0.000	0.002	0.00	0.00
50104	MONTREAL	56	0.010	0.001	0.011	0.12	0.34
50109	MONTREAL	40	0.016	0.001	0.017	0.07	0.15
50307	QUEBEC CITY	53	0.008	0.001	0.008	0.13	0.38
60104	OTTAWA	47	0.008	0.001	0.008	0.05	0.16
60417	TORONTO	41	0.012	0.000	0.012	0.01	0.03
70119	WINNIPEG	40	0.013	0.001	0.014	0.09	0.26
90130	EDMONTON	34	0.007	0.001	0.008	0.14	0.26
90204	CALGARY	49	0.016	0.001	0.017	0.13	0.27
00118	VANCOUVER	38	0.002	0.001	0.003	0.16	0.45
00111	VANCOUVER	68	0.005	0.001	0.006	0.10	0.20
00303	VICTORIA	54	0.002	0.001	0.002	0.34	1.03
60204	WINDSOR	67	0.013	0.002	0.014	0.11	0.24
61901	WALPOLE ISLAND	23	0.008	0.002	0.009	0.27	0.59

Table A12 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Titanium (Ti)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.019	0.006	0.025	0.32	0.37
50104	MONTREAL	56	0.036	0.016	0.052	0.43	0.34
50109	MONTREAL	40	0.064	0.016	0.080	0.26	0.14
50307	QUEBEC CITY	53	0.026	0.007	0.032	0.30	0.38
60104	OTTAWA	47	0.020	0.005	0.025	0.28	0.33
60417	TORONTO	41	0.031	0.005	0.036	0.12	0.15
70119	WINNIPEG	40	0.027	0.005	0.031	0.19	0.19
90130	EDMONTON	34	0.053	0.006	0.058	0.13	0.15
90204	CALGARY	49	0.034	0.008	0.042	0.23	0.21
00118	VANCOUVER	38	0.022	0.008	0.030	0.40	0.74
00111	VANCOUVER	68	0.047	0.012	0.059	0.31	0.58
00303	VICTORIA	54	0.017	0.005	0.022	0.47	1.32
60204	WINDSOR	67	0.033	0.006	0.039	0.17	0.19
61901	WALPOLE ISLAND	23	0.021	0.003	0.024	0.12	0.19

Table A13 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Vanadium (V)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.034	0.096	0.130	3.01	0.91
50104	MONTRÉAL	56	0.005	0.010	0.015	1.84	1.25
50109	MONTRÉAL	40	0.010	0.010	0.021	1.01	0.62
50307	QUEBEC CITY	53	0.004	0.009	0.013	1.91	1.33
60104	OTTAWA	47	0.003	0.005	0.008	1.02	0.95
60417	TORONTO	41	0.004	0.003	0.006	0.77	0.59
70119	WINNIPEG	39	0.003	0.001	0.005	0.37	0.47
90130	EDMONTON	34	0.007	0.003	0.010	0.42	0.54
90204	CALGARY	49	0.006	0.003	0.009	0.45	0.48
00118	VANCOUVER	38	0.004	0.008	0.012	1.57	0.87
00111	VANCOUVER	68	0.005	0.006	0.011	1.10	0.58
00303	VICTORIA	54	0.004	0.009	0.013	1.82	0.65
60204	WINDSOR	67	0.005	0.003	0.007	0.48	0.51
61901	WALPOLE ISLAND	23	0.002	0.001	0.002	0.43	0.63

Table A14 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Chromium (Cr)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.005	0.003	0.008	0.67	0.59
50104	MONTRÉAL	56	0.005	0.005	0.010	0.86	0.61
50109	MONTRÉAL	40	0.009	0.005	0.014	0.55	0.26
50307	QUEBEC CITY	53	0.003	0.002	0.005	0.67	0.72
60104	OTTAWA	47	0.003	0.003	0.005	0.75	0.53
60417	TORONTO	41	0.004	0.003	0.007	0.57	0.61
70119	WINNIPEG	40	0.003	0.002	0.005	0.42	0.55
90130	EDMONTON	34	0.008	0.005	0.013	0.58	0.48
90204	CALGARY	49	0.005	0.004	0.009	0.71	0.46
00118	VANCOUVER	38	0.004	0.003	0.007	0.68	0.56
00111	VANCOUVER	68	0.007	0.004	0.012	0.59	0.46
00303	VICTORIA	54	0.002	0.003	0.005	1.07	0.57
60204	WINDSOR	67	0.005	0.002	0.007	0.43	0.52
61901	WALPOLE ISLAND	23	0.001	0.000	0.001	0.00	0.00

Table A15 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Manganese (Mn)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.007	0.010	0.016	1.73	0.94
50104	MONTREAL	56	0.020	0.033	0.053	2.01	0.90
50109	MONTREAL	40	0.036	0.047	0.083	1.49	0.53
50307	QUEBEC CITY	53	0.010	0.014	0.024	1.74	0.84
60104	OTTAWA	47	0.010	0.013	0.023	1.58	0.78
60417	TORONTO	41	0.013	0.015	0.028	1.40	0.49
70119	WINNIPEG	40	0.009	0.008	0.017	1.19	1.10
90130	EDMONTON	34	0.019	0.012	0.031	0.77	0.48
90204	CALGARY	49	0.012	0.013	0.025	1.08	0.49
00118	VANCOUVER	38	0.010	0.024	0.035	2.49	0.93
00111	VANCOUVER	68	0.013	0.018	0.031	1.59	1.01
00303	VICTORIA	54	0.006	0.013	0.020	2.21	1.24
60204	WINDSOR	67	0.017	0.015	0.033	1.03	0.60
61901	WALPOLE ISLAND	23	0.006	0.004	0.010	0.73	0.62

Table A16 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Iron (Fe)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.218	0.049	0.266	0.31	0.18
50104	MONTREAL	56	0.309	0.121	0.430	0.43	0.20
50109	MONTREAL	40	0.630	0.148	0.778	0.24	0.10
50307	QUEBEC CITY	53	0.237	0.047	0.285	0.35	0.50
60104	OTTAWA	47	0.189	0.040	0.229	0.28	0.16
60417	TORONTO	41	0.349	0.080	0.429	0.27	0.13
70119	WINNIPEG	40	0.271	0.055	0.326	0.30	0.27
90130	EDMONTON	34	0.620	0.064	0.684	0.12	0.06
90204	CALGARY	49	0.386	0.100	0.487	0.27	0.08
00118	VANCOUVER	38	0.238	0.076	0.313	0.35	0.13
00111	VANCOUVER	68	0.349	0.096	0.445	0.35	0.59
00303	VICTORIA	54	0.144	0.035	0.179	0.37	1.05
60204	WINDSOR	67	0.542	0.187	0.729	0.33	0.15
61901	WALPOLE ISLAND	23	0.184	0.048	0.232	0.34	0.24

Table A17 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Cobalt (Co)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.002	0.001	0.003	0.45	0.49
50104	MONTREAL	56	0.002	0.001	0.003	0.49	0.48
50109	MONTREAL	40	0.004	0.001	0.005	0.33	0.32
50307	QUEBEC CITY	53	0.002	0.001	0.002	0.49	0.76
60104	OTTAWA	47	0.001	0.001	0.002	0.56	0.53
60417	TORONTO	41	0.002	0.001	0.003	0.38	0.44
70119	WINNIPEG	40	0.002	0.000	0.002	0.13	0.32
90130	EDMONTON	34	0.004	0.001	0.005	0.25	0.31
90204	CALGARY	49	0.003	0.001	0.004	0.39	0.49
00118	VANCOUVER	38	0.002	0.001	0.003	0.60	0.50
00111	VANCOUVER	68	0.002	0.001	0.004	0.46	0.45
00303	VICTORIA	54	0.001	0.001	0.002	0.66	0.60
60204	WINDSOR	67	0.003	0.001	0.004	0.34	0.36
61901	WALPOLE ISLAND	23	0.001	0.000	0.001		

Table A18 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Nickel (Ni)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.008	0.018	0.026	2.30	0.70
50104	MONTRÉAL	56	0.002	0.004	0.006	1.94	0.74
50109	MONTRÉAL	40	0.003	0.004	0.007	1.30	0.43
50307	QUEBEC CITY	53	0.002	0.003	0.005	1.61	0.83
60104	OTTAWA	47	0.002	0.002	0.003	1.07	0.71
60417	TORONTO	41	0.002	0.002	0.004	1.10	0.50
70119	WINNIPEG	40	0.001	0.001	0.002	0.66	0.74
90130	EDMONTON	34	0.002	0.001	0.004	0.68	0.60
90204	CALGARY	49	0.002	0.002	0.003	1.00	0.54
00118	VANCOUVER	38	0.002	0.004	0.006	2.02	0.90
00111	VANCOUVER	68	0.003	0.003	0.006	1.29	0.62
00303	VICTORIA	54	0.002	0.004	0.006	2.31	0.93
60204	WINDSOR	67	0.002	0.001	0.003	0.84	0.51
61901	WALPOLE ISLAND	23	0.001	0.000	0.001	0.36	0.62

Table A19 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Copper (Cu)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.019	0.021	0.040	1.24	0.46
50104	MONTRÉAL	56	0.017	0.024	0.040	1.46	0.84
50109	MONTRÉAL	40	0.020	0.020	0.041	0.95	0.34
50307	QUEBEC CITY	53	0.017	0.014	0.032	1.26	0.70
60104	OTTAWA	47	0.013	0.018	0.031	1.32	0.48
60417	TORONTO	41	0.015	0.016	0.031	1.12	0.44
70119	WINNIPEG	40	0.013	0.016	0.029	1.25	0.44
90130	EDMONTON	34	0.017	0.022	0.039	1.41	0.76
90204	CALGARY	49	0.013	0.018	0.030	1.58	1.00
00118	VANCOUVER	38	0.018	0.015	0.033	0.85	0.49
00111	VANCOUVER	68	0.020	0.019	0.038	1.17	1.36
00303	VICTORIA	54	0.014	0.018	0.032	1.28	0.47
60204	WINDSOR	67	0.006	0.007	0.013	1.55	1.51
61901	WALPOLE ISLAND	23	0.004	0.003	0.007	0.80	0.65

Table A20 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Zinc (Zn)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.024	0.019	0.043	3.53	4.46
50104	MONTREAL	56	0.033	0.049	0.082	1.97	1.06
50109	MONTREAL	40	0.064	0.060	0.124	1.66	2.73
50307	QUEBEC CITY	53	0.033	0.039	0.072	2.14	1.78
60104	OTTAWA	47	0.009	0.016	0.025	2.47	1.72
60417	TORONTO	41	0.017	0.038	0.055	2.39	1.26
70119	WINNIPEG	40	0.008	0.012	0.020	1.74	1.25
90130	EDMONTON	34	0.012	0.013	0.025	1.18	0.71
90204	CALGARY	49	0.011	0.014	0.025	1.39	0.98
00118	VANCOUVER	38	0.026	0.048	0.074	2.31	1.55
00111	VANCOUVER	68	0.020	0.022	0.041	1.79	1.45
00303	VICTORIA	54	0.006	0.021	0.027	3.84	3.38
60204	WINDSOR	67	0.046	0.093	0.138	2.48	1.51
61901	WALPOLE ISLAND	23	0.008	0.020	0.028	3.81	4.76

Table A21 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Gallium (Ga)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.004	0.005	0.008	1.33	0.76
50104	MONTREAL	56	0.003	0.004	0.007	1.22	0.45
50109	MONTREAL	40	0.003	0.005	0.008	1.52	0.59
50307	QUEBEC CITY	53	0.003	0.004	0.007	1.71	0.97
60104	OTTAWA	47	0.003	0.004	0.007	1.32	0.77
60417	TORONTO	41	0.003	0.004	0.007	1.38	1.20
70119	WINNIPEG	40	0.004	0.005	0.009	1.40	0.64
90130	EDMONTON	34	0.003	0.005	0.008	1.63	0.83
90204	CALGARY	49	0.003	0.005	0.008	1.79	1.11
00118	VANCOUVER	38	0.003	0.004	0.007	1.29	0.75
00111	VANCOUVER	68	0.004	0.005	0.009	1.66	1.00
00303	VICTORIA	54	0.004	0.005	0.008	1.30	0.66
60204	WINDSOR	67	0.001	0.001	0.003	1.10	0.93
61901	WALPOLE ISLAND	23	0.001	0.001	0.002	0.90	0.74

Table A22 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Germanium (Ge)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.001	0.001	1.02	0.70
50104	MONTREAL	56	0.000	0.001	0.001	0.91	0.71
50109	MONTREAL	40	0.001	0.001	0.002	1.39	0.93
50307	QUEBEC CITY	53	0.000	0.001	0.001	1.49	1.53
60104	OTTAWA	47	0.000	0.001	0.001	0.87	0.67
60417	TORONTO	41	0.001	0.001	0.001	1.22	0.65
70119	WINNIPEG	40	0.000	0.000	0.001	1.10	0.58
90130	EDMONTON	34	0.000	0.001	0.001	1.32	0.64
90204	CALGARY	49	0.001	0.001	0.002	1.48	0.52
00118	VANCOUVER	38	0.000	0.001	0.001	1.63	1.14
00111	VANCOUVER	68	0.001	0.001	0.002	1.44	0.64
00303	VICTORIA	54	0.001	0.001	0.002	1.67	0.96
60204	WINDSOR	67	0.000	0.000	0.000	0.98	0.71
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	0.00

Table A23 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Arsenic (As)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.000	0.001	0.95	1.90
50104	MONTREAL	56	0.000	0.001	0.001	1.28	1.88
50109	MONTREAL	40	0.000	0.002	0.002	5.04	7.65
50307	QUEBEC CITY	53	0.000	0.001	0.001	1.95	2.14
60104	OTTAWA	47	0.000	0.001	0.001	1.24	2.47
60417	TORONTO	41	0.000	0.001	0.001	3.58	6.02
70119	WINNIPEG	40	0.000	0.000	0.000	0.00	0.00
90130	EDMONTON	34	0.000	0.001	0.001	1.48	1.79
90204	CALGARY	49	0.000	0.001	0.001	1.16	2.59
00118	VANCOUVER	38	0.000	0.001	0.001	4.22	3.89
00111	VANCOUVER	68	0.000	0.001	0.001	2.37	2.63
00303	VICTORIA	54	0.000	0.000	0.001	0.20	0.48
60204	WINDSOR	67	0.000	0.001	0.001	2.43	2.54
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	

Table A24 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Selenium (Se)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.001	0.001	1.79	0.87
50104	MONTRÉAL	56	0.001	0.005	0.006	10.35	12.45
50109	MONTRÉAL	40	0.001	0.003	0.004	5.32	5.29
50307	QUEBEC CITY	53	0.000	0.001	0.002	2.41	1.70
60104	OTTAWA	47	0.000	0.001	0.001	1.81	0.80
60417	TORONTO	41	0.000	0.002	0.002	4.34	4.80
70119	WINNIPEG	40	0.000	0.001	0.001	1.62	1.06
90130	EDMONTON	34	0.000	0.001	0.001	1.30	0.71
90204	CALGARY	49	0.000	0.001	0.001	1.53	0.99
00118	VANCOUVER	38	0.000	0.001	0.002	2.47	1.16
00111	VANCOUVER	68	0.000	0.001	0.001	1.84	0.92
00303	VICTORIA	54	0.000	0.001	0.002	2.32	1.17
60204	WINDSOR	67	0.000	0.003	0.003	14.75	23.04
61901	WALPOLE ISLAND	23	0.000	0.001	0.002	4.30	2.88

Table A25 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Bromine (Br)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.004	0.006	0.010	1.95	0.81
50104	MONTREAL	56	0.006	0.036	0.042	5.78	2.00
50109	MONTREAL	40	0.016	0.076	0.091	4.64	1.68
50307	QUEBEC CITY	53	0.008	0.045	0.053	5.78	4.02
60104	OTTAWA	47	0.005	0.022	0.026	4.17	1.80
60417	TORONTO	41	0.006	0.026	0.033	4.12	1.25
70119	WINNIPEG	40	0.003	0.015	0.018	4.69	2.00
90130	EDMONTON	34	0.009	0.034	0.043	3.46	1.00
90204	CALGARY	49	0.009	0.049	0.058	5.69	3.62
00118	VANCOUVER	38	0.021	0.109	0.130	4.91	1.59
00111	VANCOUVER	68	0.014	0.063	0.077	3.99	1.97
00303	VICTORIA	54	0.019	0.078	0.097	3.85	2.52
60204	WINDSOR	67	0.003	0.015	0.018	5.37	3.31
61901	WALPOLE ISLAND	23	0.000	0.003	0.003	8.77	6.72

Table A26 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Rubidium (Rb)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.000	0.001	0.45	0.54
50104	MONTREAL	56	0.001	0.000	0.001	0.44	0.69
50109	MONTREAL	40	0.001	0.000	0.001	0.18	0.28
50307	QUEBEC CITY	53	0.001	0.000	0.001	0.24	0.49
60104	OTTAWA	47	0.001	0.000	0.001	0.25	0.41
60417	TORONTO	41	0.001	0.000	0.001	0.22	0.38
70119	WINNIPEG	40	0.001	0.000	0.001	0.06	0.16
90130	EDMONTON	34	0.001	0.000	0.001	0.07	0.22
90204	CALGARY	49	0.001	0.000	0.001	0.12	0.25
00118	VANCOUVER	38	0.000	0.000	0.000	0.58	0.40
00111	VANCOUVER	68	0.000	0.000	0.000	0.18	0.39
00303	VICTORIA	54	0.000	0.000	0.000	0.50	0.68
60204	WINDSOR	67	0.000	0.001	0.001	1.16	1.67
61901	WALPOLE ISLAND	23	0.000	0.000	0.001	0.08	0.16

Table A27 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Strontium (Sr)

Station Number	City	No. of Samples	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.002	0.001	0.002	0.56
50104	MONTREAL	56	0.005	0.001	0.006	0.38
50109	MONTREAL	40	0.011	0.004	0.015	0.33
50307	QUEBEC CITY	53	0.006	0.001	0.007	0.28
60104	OTTAWA	47	0.003	0.001	0.004	0.31
60417	TORONTO	41	0.003	0.001	0.004	0.36
70119	WINNIPEG	40	0.005	0.001	0.006	0.33
90130	EDMONTON	34	0.003	0.001	0.004	0.27
90204	CALGARY	49	0.003	0.001	0.004	0.36
00118	VANCOUVER	38	0.002	0.001	0.003	0.55
00111	VANCOUVER	68	0.002	0.001	0.003	0.57
00303	VICTORIA	54	0.002	0.001	0.002	0.58
60204	WINDSOR	67	0.004	0.001	0.005	0.13
61901	WALPOLE ISLAND	23	0.002	0.000	0.002	0.17

Table A28 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Yttrium (Y)

Station Number	City	No. of Samples	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.001	0.92	0.73
50104	MONTREAL	56	0.000	0.001	0.84	0.91
50109	MONTREAL	40	0.001	0.000	0.61	0.63
50307	QUEBEC CITY	53	0.000	0.000	0.86	0.78
60104	OTTAWA	47	0.000	0.000	1.08	0.73
60417	TORONTO	41	0.000	0.000	0.001	0.87
70119	WINNIPEG	40	0.000	0.000	0.001	0.76
90130	EDMONTON	34	0.001	0.000	1.06	0.76
90204	CALGARY	49	0.001	0.000	0.001	0.53
00118	VANCOUVER	38	0.000	0.000	0.72	0.57
00111	VANCOUVER	68	0.001	0.000	0.001	0.76
00303	VICTORIA	54	0.000	0.000	0.000	0.50
60204	WINDSOR	67	0.000	0.000	0.000	0.00
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00

Table A29 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Zirconium (Zr)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.001	0.002	0.98	0.70
50104	MONTREAL	56	0.002	0.001	0.002	0.53	0.35
50109	MONTREAL	40	0.003	0.001	0.004	0.58	1.19
50307	QUEBEC CITY	53	0.001	0.001	0.002	0.74	0.54
60104	OTTAWA	47	0.001	0.001	0.002	1.21	2.52
60417	TORONTO	41	0.002	0.001	0.003	0.53	0.56
70119	WINNIPEG	40	0.002	0.001	0.002	0.73	0.33
90130	EDMONTON	34	0.002	0.001	0.003	0.39	0.26
90204	CALGARY	49	0.002	0.001	0.003	0.44	0.26
00118	VANCOUVER	38	0.001	0.001	0.002	0.51	0.43
00111	VANCOUVER	68	0.001	0.001	0.002	0.62	0.42
00303	VICTORIA	54	0.001	0.001	0.001	0.78	0.43
60204	WINDSOR	67	0.001	0.000	0.001	0.01	0.06
61901	WALPOLE ISLAND	23	0.001	0.000	0.001	0.08	0.18

Table A30 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Niobium (Nb)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.001	0.001	1.09	0.59
50104	MONTREAL	56	0.001	0.000	0.001	0.94	0.60
50109	MONTREAL	40	0.001	0.000	0.001	0.67	0.60
50307	QUEBEC CITY	53	0.000	0.000	0.001	0.95	0.61
60104	OTTAWA	47	0.001	0.001	0.001	1.17	0.68
60417	TORONTO	41	0.000	0.000	0.001	0.65	0.53
70119	WINNIPEG	40	0.001	0.001	0.001	0.97	0.53
90130	EDMONTON	34	0.001	0.001	0.001	0.81	0.59
90204	CALGARY	49	0.000	0.000	0.001	0.79	0.59
00118	VANCOUVER	38	0.000	0.000	0.001	1.02	0.59
00111	VANCOUVER	68	0.001	0.001	0.001	1.07	0.63
00303	VICTORIA	54	0.000	0.000	0.001	0.54	0.61
60204	WINDSOR	67	0.000	0.000	0.000	0.00	0.00
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	0.00

Table A31 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Molybdenum (Mo)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.002	0.002	0.004	1.33	0.52
50104	MONTREAL	56	0.001	0.002	0.003	1.47	0.65
50109	MONTREAL	40	0.002	0.002	0.004	1.26	0.42
50307	QUEBEC CITY	53	0.001	0.001	0.003	1.24	0.68
60104	OTTAWA	47	0.001	0.001	0.003	1.14	0.51
60417	TORONTO	41	0.001	0.001	0.003	1.05	0.54
70119	WINNIPEG	40	0.002	0.002	0.003	1.23	0.62
90130	EDMONTON	34	0.001	0.001	0.003	1.11	0.33
90204	CALGARY	49	0.001	0.002	0.003	1.14	0.41
00118	VANCOUVER	38	0.001	0.001	0.003	0.87	0.50
00111	VANCOUVER	68	0.002	0.002	0.004	0.98	0.51
00303	VICTORIA	54	0.001	0.001	0.003	0.95	0.49
60204	WINDSOR	67	0.000	0.001	0.001	1.17	1.04
61901	WALPOLE ISLAND	23	0.000	0.000	0.001	0.97	0.94

Table A32 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Palladium (Pd)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.000	0.000	0.00	0.00
50104	MONTREAL	56	0.000	0.000	0.000	0.00	0.00
50109	MONTREAL	40	0.000	0.000	0.000	0.00	0.00
50307	QUEBEC CITY	53	0.000	0.000	0.000	0.00	0.00
60104	OTTAWA	47	0.000	0.000	0.000	0.00	0.00
60417	TORONTO	41	0.000	0.000	0.000	0.00	0.00
70119	WINNIPEG	40	0.000	0.000	0.000	0.00	0.00
90130	EDMONTON	34	0.000	0.000	0.000	0.00	0.00
90204	CALGARY	49	0.000	0.000	0.001	0.16	0.39
00118	VANCOUVER	38	0.000	0.000	0.001	0.21	0.48
00111	VANCOUVER	68	0.000	0.000	0.000	0.00	0.00
00303	VICTORIA	54	0.000	0.000	0.000	0.00	0.00
60204	WINDSOR	67	0.002	0.000	0.002	0.00	0.00
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	0.00

Table A33 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Silver (Ag)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.000	0.001	0.001	0.19	0.45
50104	MONTREAL	56	0.001	0.000	0.001	0.15	0.44
50109	MONTREAL	40	0.001	0.002	0.002	0.16	0.44
50307	QUEBEC CITY	53	0.000	0.001	0.001	0.58	0.76
60104	OTTAWA	47	0.000	0.000	0.001	0.16	0.46
60417	TORONTO	41	0.001	0.000	0.001	0.14	0.40
70119	WINNIPEG	40	0.000	0.000	0.001	0.00	0.00
90130	EDMONTON	34	0.000	0.001	0.001	0.00	0.00
90204	CALGARY	49	0.000	0.001	0.001	0.52	0.72
00118	VANCOUVER	38	0.000	0.001	0.001	0.00	
00111	VANCOUVER	68	0.000	0.000	0.001	0.00	0.00
00303	VICTORIA	54	0.001	0.000	0.001	0.20	0.42
60204	WINDSOR	67	0.000	0.000	0.001	0.45	0.86
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	0.00

Table A34 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Cadmium(Cd)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.001	0.002	1.02	0.69
50104	MONTREAL	56	0.001	0.002	0.003	0.93	0.91
50109	MONTREAL	40	0.001	0.001	0.002	0.76	1.35
50307	QUEBEC CITY	53	0.001	0.001	0.002	0.78	0.74
60104	OTTAWA	47	0.000	0.001	0.001	0.47	0.54
60417	TORONTO	41	0.000	0.001	0.001		
70119	WINNIPEG	40	0.000	0.000	0.000		
90130	EDMONTON	34	0.000	0.000	0.000		
90204	CALGARY	49	0.001	0.001	0.002	0.95	0.86
00118	VANCOUVER	38	0.002	0.002	0.004	0.70	0.60
00111	VANCOUVER	68	0.001	0.000	0.001	0.04	0.16
00303	VICTORIA	54	0.001	0.001	0.002	1.03	0.63
60204	WINDSOR	67	0.001	0.002	0.003	2.14	2.63
61901	WALPOLE ISLAND	23	0.000	0.000	0.000		

Table A35 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Indium (In)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.001	0.001	0.24	0.41
50104	MONTREAL	56	0.001	0.001	0.001	0.08	0.23
50109	MONTREAL	40	0.000	0.000	0.001	0.00	0.00
50307	QUEBEC CITY	53	0.001	0.001	0.001	0.14	0.41
60104	OTTAWA	47	0.000	0.000	0.001	0.24	0.53
60417	TORONTO	41	0.000	0.000	0.001	0.00	0.00
70119	WINNIPEG	40	0.000	0.001	0.001	0.00	0.00
90130	EDMONTON	34	0.001	0.001	0.001	0.00	0.00
90204	CALGARY	49	0.000	0.001	0.001	0.00	0.00
00118	VANCOUVER	38	0.000	0.000	0.001	0.00	0.00
00111	VANCOUVER	68	0.000	0.000	0.001	0.18	0.44
00303	VICTORIA	54	0.000	0.000	0.001	0.20	0.54
60204	WINDSOR	67	0.001	0.001	0.001	0.19	0.61
61901	WALPOLE ISLAND	23	0.001	0.001	0.001	0.72	0.28

Table A36 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Tin (Sn)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.008	0.011	0.019	1.35	0.49
50104	MONTRÉAL	56	0.007	0.011	0.018	1.73	1.63
50109	MONTRÉAL	40	0.007	0.016	0.023	2.10	0.91
50307	QUEBEC CITY	53	0.008	0.009	0.016	1.07	0.50
60104	OTTAWA	47	0.007	0.008	0.015	1.14	0.55
60417	TORONTO	41	0.006	0.010	0.017	1.51	0.62
70119	WINNIPEG	40	0.007	0.009	0.017	1.22	0.49
90130	EDMONTON	34	0.008	0.010	0.017	1.22	0.50
90204	CALGARY	49	0.008	0.009	0.017	1.13	0.46
00118	VANCOUVER	38	0.007	0.009	0.015	1.30	0.81
00111	VANCOUVER	68	0.007	0.008	0.014	1.14	0.48
00303	VICTORIA	54	0.007	0.009	0.016	1.35	0.58
60204	WINDSOR	67	0.002	0.003	0.005	1.01	1.22
61901	WALPOLE ISLAND	23	0.001	0.003	0.003	0.68	0.42

Table A37 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Antimony (Sb)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.003	0.003	0.005	0.53	0.69
50104	MONTREAL	56	0.002	0.002	0.004	0.73	0.83
50109	MONTREAL	40	0.003	0.004	0.007	0.82	0.88
50307	QUEBEC CITY	53	0.002	0.002	0.004	0.55	0.73
60104	OTTAWA	47	0.002	0.003	0.004	0.65	0.81
60417	TORONTO	41	0.001	0.003	0.004	0.88	0.89
70119	WINNIPEG	40	0.002	0.004	0.006	0.73	1.15
90130	EDMONTON	34	0.002	0.005	0.007	0.76	0.81
90204	CALGARY	49	0.002	0.003	0.005	0.92	0.89
00118	VANCOUVER	38	0.002	0.004	0.006	0.84	1.52
00111	VANCOUVER	68	0.003	0.004	0.006	0.77	0.79
00303	VICTORIA	54	0.002	0.003	0.005	0.74	0.73
60204	WINDSOR	67	0.004	0.005	0.009	1.13	0.83
61901	WALPOLE ISLAND	23	0.003	0.003	0.006	1.37	1.43

Table A38 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Tellurium (Te)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.002	0.003	0.006	1.21	1.30
50104	MONTREAL	56	0.001	0.003	0.004	0.67	1.00
50109	MONTREAL	40	0.003	0.002	0.005	0.32	0.63
50307	QUEBEC CITY	53	0.003	0.002	0.005	0.61	0.63
60104	OTTAWA	47	0.002	0.003	0.004	0.50	0.89
60417	TORONTO	41	0.002	0.003	0.005	1.21	1.10
70119	WINNIPEG	40	0.001	0.003	0.004	0.94	0.57
90130	EDMONTON	34	0.003	0.003	0.006	0.78	0.66
90204	CALGARY	49	0.004	0.003	0.007	0.74	0.80
00118	VANCOUVER	38	0.002	0.003	0.004	0.86	0.97
00111	VANCOUVER	68	0.002	0.002	0.004	0.67	0.66
00303	VICTORIA	54	0.002	0.004	0.007	1.26	1.50
60204	WINDSOR	67	0.001	0.001	0.003	0.52	1.04
61901	WALPOLE ISLAND	23	0.002	0.002	0.004	0.58	0.40

Table A39 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Iodine (I)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.003	0.005	0.87	0.64
50104	MONTREAL	56	0.002	0.001	0.003	0.41	0.61
50109	MONTREAL	40	0.002	0.001	0.002	0.19	0.61
50307	QUEBEC CITY	53	0.001	0.002	0.003	0.29	0.54
60104	OTTAWA	47	0.001	0.003	0.004	0.42	0.73
60417	TORONTO	41	0.002	0.002	0.003	0.75	1.20
70119	WINNIPEG	40	0.001	0.002	0.003	0.77	1.11
90130	EDMONTON	34	0.002	0.003	0.005	0.32	0.60
90204	CALGARY	49	0.001	0.004	0.005	0.65	0.73
00118	VANCOUVER	38	0.001	0.001	0.002	0.35	0.61
00111	VANCOUVER	68	0.001	0.003	0.004	0.35	0.54
00303	VICTORIA	54	0.002	0.002	0.005	0.41	0.61
60204	WINDSOR	67	0.001	0.001	0.001	0.73	1.03
61901	WALPOLE ISLAND	23	0.000	0.000	0.000	0.00	

Table A40 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Cesium (Cs)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.001	0.001	0.001	0.00	0.00
50104	MONTREAL	56	0.001	0.001	0.002	0.00	0.00
50109	MONTREAL	40	0.001	0.001	0.002	0.68	0.78
50307	QUEBEC CITY	53	0.002	0.001	0.003	0.13	0.38
60104	OTTAWA	47	0.000	0.001	0.001	0.97	
60417	TORONTO	41	0.001	0.001	0.002	0.00	0.00
70119	WINNIPEG	40	0.000	0.001	0.002	0.81	1.14
90130	EDMONTON	34	0.000	0.001	0.002	1.13	
90204	CALGARY	49	0.001	0.000	0.001	0.00	0.00
00118	VANCOUVER	38	0.001	0.002	0.002	0.47	0.66
00111	VANCOUVER	68	0.001	0.001	0.001	0.30	0.61
00303	VICTORIA	54	0.000	0.001	0.001	0.00	
60204	WINDSOR	67	0.000	0.000	0.000		
61901	WALPOLE ISLAND	23	0.000	0.000	0.000		

Table A41 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Barium (Ba)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.009	0.004	0.013	0.30	0.55
50104	MONTREAL	56	0.010	0.007	0.017	0.49	0.57
50109	MONTREAL	40	0.026	0.010	0.036	0.38	0.38
50307	QUEBEC CITY	53	0.008	0.004	0.012	0.25	0.48
60104	OTTAWA	47	0.008	0.005	0.013	0.47	0.75
60417	TORONTO	41	0.010	0.004	0.014	0.33	0.55
70119	WINNIPEG	40	0.010	0.007	0.017	0.60	0.53
90130	EDMONTON	34	0.017	0.006	0.023	0.34	0.49
90204	CALGARY	49	0.013	0.005	0.017	0.36	0.52
00118	VANCOUVER	38	0.009	0.004	0.013	0.23	0.45
00111	VANCOUVER	68	0.010	0.005	0.015	0.25	0.49
00303	VICTORIA	54	0.008	0.004	0.013	0.24	0.45
60204	WINDSOR	67	0.008	0.001	0.009	0.06	0.22
61901	WALPOLE ISLAND	23	0.001	0.002	0.002	0.00	0.00

Table A42 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Lanthanum (La)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.006	0.010	0.016	0.34	0.62
50104	MONTREAL	56	0.006	0.007	0.013	0.67	0.77
50109	MONTREAL	40	0.007	0.009	0.016	0.32	0.59
50307	QUEBEC CITY	53	0.006	0.007	0.013	0.44	0.65
60104	OTTAWA	47	0.007	0.007	0.013	0.47	0.63
60417	TORONTO	41	0.004	0.010	0.013	0.50	0.77
70119	WINNIPEG	40	0.007	0.009	0.016	0.52	0.82
90130	EDMONTON	34	0.008	0.006	0.013	0.23	0.62
90204	CALGARY	49	0.004	0.007	0.011	0.40	0.69
00118	VANCOUVER	38	0.005	0.008	0.013	0.47	0.65
00111	VANCOUVER	68	0.007	0.008	0.015	0.42	0.70
00303	VICTORIA	54	0.005	0.005	0.010	0.28	0.61
60204	WINDSOR	67	0.001	0.002	0.003	0.60	1.03
61901	WALPOLE ISLAND	23	0.001	0.002	0.002	0.00	0.00

Table A43 : Mean Concentration ($\mu\text{g}/\text{m}^3$) of Lead (Pb)

Station Number	City	No. of Samples	Coarse	Fine	Total	F/C Ratio	Std. Dev. of Ratio
30101	HALIFAX	50	0.008	0.034	0.042	4.40	1.65
50104	MONTREAL	56	0.030	0.129	0.159	4.64	1.81
50109	MONTREAL	40	0.070	0.220	0.290	3.26	0.99
50307	QUEBEC CITY	53	0.033	0.149	0.181	4.96	2.86
60104	OTTAWA	47	0.017	0.082	0.099	4.63	1.51
60417	TORONTO	41	0.027	0.111	0.138	4.09	1.16
70119	WINNIPEG	40	0.016	0.051	0.067	3.31	1.22
90130	EDMONTON	34	0.040	0.123	0.163	3.02	0.87
90204	CALGARY	49	0.038	0.167	0.205	4.53	1.23
00118	VANCOUVER	38	0.069	0.329	0.399	4.91	1.27
00111	VANCOUVER	68	0.048	0.204	0.252	4.33	1.17
00303	VICTORIA	54	0.058	0.250	0.308	4.14	1.87
60204	WINDSOR	67	0.015	0.053	0.068	4.06	1.87
61901	WALPOLE ISLAND	23	0.004	0.013	0.017	5.25	3.70

APPENDIX B

FREQUENCY DISTRIBUTION of CONCENTRATIONS of ELEMENTS MEASURED by EDXRF

Table B1 : Frequency Distribution of Mass Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	11	16	19	24	26	30	33	41	56	62	62	26	11
50104	MONTREAL	54	9	13	25	31	34	35	46	50	60	66	66	32	14
50109	MONTREAL	40	16	28	38	44	47	54	60	81	95	97	97	48	19
50307	QUEBEC CITY	53	6	10	14	19	27	30	36	43	57	61	61	24	14
60104	OTTAWA	47	6	10	16	20	24	28	35	41	50	62	62	24	13
60417	TORONTO	39	9	12	18	24	25	31	37	47	58	83	83	27	15
70119	WINNIPEG	40	7	15	20	25	28	34	38	56	77	95	95	30	18
90130	EDMONTON	34	10	19	25	30	35	37	47	54	60	83	83	33	15
90204	CALGARY	49	9	15	21	29	32	35	37	44	52	83	83	29	13
00118	VANCOUVER	38	14	16	21	26	28	32	40	57	61	69	69	30	13
00111	VANCOUVER	68	9	16	24	34	36	38	41	45	47	64	64	32	11
00303	VICTORIA	54	4	9	14	20	22	24	29	33	46	59	59	21	11
60204	WINDSOR	67	10	14	24	31	35	39	51	64	92	102	102	37	22
61901	WALPOLE ISLAND	23	6	12	17	23	24	26	30	59	70	74	74	27	18

Table B2 : Frequency Distribution of Sulphate (SO₄) Concentrations (µg/m³)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.9	2.1	3.3	4.5	5.1	5.7	7.3	8.1	8.8	10.8	10.8	4.8	2.3
50104	MONTREAL	56	0.3	1.7	2.3	3.6	4.7	5.1	7.1	9.3	11.4	12.3	12.3	4.5	3.0
50109	MONTREAL	39	0.5	1.4	2.7	4.0	4.8	5.9	7.7	10.2	12.5	17.1	17.1	4.9	3.6
50307	QUEBEC CITY	51	0.4	0.8	1.4	2.0	2.5	3.3	4.8	5.6	6.8	10.0	10.0	2.8	2.1
60104	OTTAWA	46	0.3	0.9	1.5	3.2	3.4	4.7	5.4	9.5	9.9	16.3	16.3	3.9	3.5
60417	TORONTO	39	0.9	1.4	2.1	3.0	3.8	4.7	6.0	8.6	13.4	15.9	15.9	4.1	3.3
70119	WINNIPEG	40	0.3	0.5	1.1	1.4	1.6	2.1	2.6	3.9	4.3	5.0	5.0	1.7	1.2
90130	EDMONTON	34	0.3	0.6	0.9	1.1	1.4	1.5	2.1	2.5	4.7	5.7	5.7	1.5	1.2
90204	CALGARY	49	0.3	0.6	0.9	1.4	1.6	1.8	1.9	2.7	3.7	9.8	9.8	1.6	1.4
00118	VANCOUVER	37	0.7	1.2	1.6	2.0	2.3	2.4	2.9	3.9	4.1	6.0	6.0	2.3	1.1
00111	VANCOUVER	65	0.0	0.8	1.6	1.9	2.3	2.5	3.1	3.3	4.2	4.6	4.6	2.1	1.0
00303	VICTORIA	54	0.2	0.9	1.4	1.8	2.0	2.2	2.5	3.1	4.3	5.7	5.7	2.0	1.0
60204	WINDSOR	67	0.7	1.6	3.0	4.4	5.9	6.9	9.2	15.4	18.6	29.6	29.6	6.7	6.4
61901	WALPOLE ISLAND	23	0.1	0.7	2.0	3.3	3.6	4.4	4.5	12.2	12.5	24.9	24.9	4.7	5.5

Table B3 : Frequency Distribution of Nitrate (NO₃) Concentrations (μg/m³)

Station Number	City	No. of Samples	Frequency Distribution												Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.			
30101	HALIFAX	50	0.2	0.4	0.5	0.6	0.7	0.8	1.1	1.3	1.6	2.3	2.3	0.7	0.4	
50104	MONTREAL	56	0.2	0.5	0.7	1.1	1.2	1.7	3.0	4.8	6.6	10.7	10.7	1.9	2.1	
50109	MONTREAL	39	0.3	0.5	0.6	0.9	1.0	1.2	1.8	2.6	5.9	8.9	8.9	1.4	1.6	
50307	QUEBEC CITY	51	0.3	0.4	0.5	0.7	0.8	1.0	1.2	1.9	3.6	4.5	4.5	1.0	0.9	
60104	OTTAWA	46	0.2	0.4	0.5	0.9	1.0	1.1	1.3	3.9	4.2	5.3	5.3	1.3	1.3	
60417	TORONTO	39	0.1	0.4	0.6	0.9	1.1	1.5	2.2	4.0	8.6	8.9	8.9	1.6	2.0	
70119	WINNIPEG	40	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.3	2.5	2.9	2.9	0.8	0.5	
90130	EDMONTON	34	0.4	0.4	0.5	0.6	0.7	0.7	1.0	1.3	1.8	3.0	3.0	0.8	0.5	
90204	CALGARY	49	0.2	0.5	0.7	0.8	0.8	1.0	1.2	1.7	2.4	7.5	7.5	1.1	1.3	
00118	VANCOUVER	37	0.6	0.6	0.9	1.1	1.4	1.5	1.6	1.8	2.5	2.6	2.6	1.2	0.5	
00111	VANCOUVER	65	0.0	0.6	0.7	0.9	1.0	1.1	1.2	1.5	1.6	1.8	1.8	0.9	0.4	
00303	VICTORIA	54	0.2	0.4	0.7	0.8	0.9	1.0	1.3	1.7	1.9	2.8	2.8	0.9	0.5	
60204	WINDSOR	67	0.0	0.2	0.6	0.9	1.0	1.2	1.6	2.6	4.2	9.4	9.4	1.2	1.4	
61901	WALPOLE ISLAND	23	0.1	0.1	0.2	0.6	0.7	0.9	1.0	1.0	1.1	1.5	1.5	0.6	0.4	

Table B4 : Frequency Distribution of Aluminum (Al) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.260	0.358	0.728	0.992	1.276	1.635	2.392	2.696	4.960	6.520	6.520	1.465	1.350
50104	MONTREAL	56	0.206	0.308	0.380	0.509	0.631	0.752	0.870	1.182	1.363	2.017	2.017	0.630	0.358
50109	MONTREAL	40	ND	0.648	0.912	1.318	1.365	1.620	2.090	2.873	3.980	10.200	10.200	1.614	1.613
50307	QUEBEC CITY	53	0.044	0.061	0.119	0.196	0.239	0.273	0.417	0.586	0.724	1.200	1.200	0.261	0.228
60104	OTTAWA	47	0.031	0.054	0.129	0.221	0.273	0.380	0.508	1.216	1.365	1.719	1.719	0.379	0.422
60417	TORONTO	41	0.033	0.081	0.149	0.226	0.270	0.311	0.342	0.454	0.578	1.841	1.841	0.300	0.344
70119	WINNIPEG	40	0.083	0.214	0.303	0.461	0.639	0.754	0.928	1.472	2.145	4.860	4.860	0.721	0.828
90130	EDMONTON	34	0.368	0.526	0.814	1.128	1.364	1.805	2.981	3.120	6.600	7.820	7.820	1.750	1.654
90204	CALGARY	49	0.048	0.133	0.280	0.391	0.491	0.556	0.671	0.846	0.918	0.949	0.949	0.443	0.246
00118	VANCOUVER	38	0.154	0.221	0.314	0.454	0.542	0.667	0.771	1.012	1.569	1.708	1.708	0.555	0.363
00111	VANCOUVER	68	0.061	0.356	0.594	0.956	1.295	1.509	1.827	2.475	3.669	5.050	5.050	1.286	1.082
00303	VICTORIA	54	0.013	0.063	0.100	0.140	0.191	0.226	0.292	0.350	0.540	0.998	0.998	0.197	0.171
60204	WINDSOR	67	ND	0.079	0.269	0.559	0.938	1.239	1.786	2.380	3.602	5.981	5.981	1.027	1.189
61901	WALPOLE ISLAND	23	ND	0.017	0.049	0.146	0.167	0.362	0.469	0.707	0.729	1.054	1.054	0.259	0.281

Table B5 : Frequency Distribution of Silicon (Si) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution												Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.			
30101	HALIFAX	50	0.097	0.208	0.349	0.510	0.589	0.744	0.928	1.312	1.322	1.818	1.818	0.606	0.412	
50104	MONTREAL	56	0.102	0.284	0.520	0.706	0.733	0.903	1.224	1.717	2.287	3.410	3.410	0.864	0.623	
50109	MONTREAL	40	ND	0.467	0.790	1.185	1.343	1.719	1.984	2.266	2.496	3.075	3.075	1.253	0.709	
50307	QUEBEC CITY	53	0.019	0.122	0.257	0.433	0.533	0.723	0.848	1.236	1.630	3.742	3.742	0.603	0.617	
60104	OTTAWA	47	0.020	0.088	0.277	0.343	0.598	0.675	0.793	1.120	1.418	4.006	4.006	0.581	0.629	
60417	TORONTO	41	ND	0.167	0.405	0.536	0.657	0.750	0.828	1.109	1.619	5.572	5.572	0.768	0.954	
70119	WINNIPEG	40	0.204	0.373	0.753	1.174	1.426	1.574	1.769	2.647	3.662	3.800	3.800	1.286	0.854	
90130	EDMONTON	34	0.287	0.616	1.495	2.153	2.288	2.624	3.614	4.080	4.519	4.930	4.930	2.212	1.245	
90204	CALGARY	49	0.115	0.554	1.082	1.681	1.872	2.111	2.521	3.084	3.211	3.466	3.466	1.657	0.891	
00118	VANCOUVER	38	0.070	0.148	0.257	0.368	0.398	0.602	0.823	0.894	1.404	2.830	2.830	0.526	0.490	
00111	VANCOUVER	68	0.035	0.134	0.295	0.567	0.632	0.840	0.928	1.195	1.332	1.499	1.499	0.596	0.388	
00303	VICTORIA	54	0.033	0.088	0.183	0.272	0.347	0.442	0.490	0.646	0.814	1.146	1.146	0.339	0.250	
60204	WINDSOR	67	0.064	0.219	0.406	0.539	0.702	0.825	0.985	1.252	1.338	3.336	3.336	0.669	0.495	
61901	WALPOLE ISLAND	23	ND	0.104	0.201	0.380	0.444	0.672	1.337	1.600	2.171	2.817	2.817	0.658	0.743	

Table B6 : Frequency Distribution of Phosphorus (P) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution												Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.			
30101	HALIFAX	50	0.007	0.022	0.028	0.038	0.042	0.052	0.061	0.083	0.087	0.096	0.096	0.043	0.021	
50104	MONTREAL	56	0.004	0.015	0.035	0.066	0.081	0.092	0.109	0.198	0.402	0.485	0.485	0.093	0.107	
50109	MONTREAL	40	ND	0.027	0.049	0.066	0.081	0.098	0.150	0.239	0.327	0.328	0.328	0.094	0.081	
50307	QUEBEC CITY	53	0.001	0.005	0.013	0.022	0.030	0.043	0.057	0.079	0.123	0.403	0.403	0.041	0.061	
60104	OTTAWA	47	0.005	0.008	0.022	0.032	0.044	0.047	0.070	0.100	0.113	0.175	0.175	0.046	0.039	
60417	TORONTO	41	ND	0.011	0.024	0.041	0.042	0.051	0.072	0.081	0.101	0.101	0.101	0.042	0.028	
70119	WINNIPEG	40	0.004	0.010	0.018	0.030	0.034	0.036	0.046	0.057	0.076	0.076	0.076	0.029	0.019	
90130	EDMONTON	34	ND	0.009	0.019	0.033	0.034	0.036	0.041	0.044	0.046	0.050	0.050	0.028	0.013	
90204	CALGARY	49	0.002	0.010	0.024	0.040	0.049	0.054	0.078	0.116	0.199	0.271	0.271	0.054	0.055	
00118	VANCOUVER	38	ND	0.016	0.024	0.034	0.037	0.038	0.054	0.078	0.091	0.102	0.102	0.039	0.023	
00111	VANCOUVER	68	0.003	0.011	0.022	0.032	0.037	0.043	0.049	0.058	0.069	0.074	0.074	0.034	0.018	
00303	VICTORIA	54	ND	0.005	0.014	0.021	0.025	0.030	0.039	0.047	0.053	0.062	0.062	0.024	0.015	
60204	WINDSOR	67	ND	0.008	0.020	0.039	0.045	0.056	0.066	0.116	0.137	0.172	0.172	0.047	0.041	
61901	WALPOLE ISLAND	23	ND	0.003	0.015	0.023	0.029	0.037	0.051	0.063	0.074	0.098	0.098	0.030	0.026	

Table B7 : Frequency Distribution of Sulphur (S) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.439	1.113	1.460	2.040	2.437	2.979	3.473	3.865	4.109	4.572	4.572	2.282	1.069
50104	MONTREAL	56	0.218	0.564	1.087	1.677	2.287	2.680	2.867	3.507	4.566	5.711	5.711	2.006	1.236
50109	MONTREAL	40	ND	0.891	1.261	1.831	2.127	2.390	3.352	4.775	5.079	5.707	5.707	2.128	1.419
50307	QUEBEC CITY	53	0.220	0.437	0.743	0.985	1.181	1.633	2.054	2.514	3.315	4.860	4.860	1.345	0.945
60104	OTTAWA	47	0.170	0.459	0.864	1.317	1.853	2.039	2.606	4.195	4.811	5.790	5.790	1.741	1.368
60417	TORONTO	41	0.431	0.688	0.986	1.482	1.861	2.107	2.767	3.467	4.831	5.988	5.988	1.899	1.312
70119	WINNIPEG	40	0.191	0.301	0.504	0.668	0.853	1.090	1.310	1.723	1.860	2.289	2.289	0.836	0.520
90130	EDMONTON	34	0.167	0.329	0.491	0.631	0.696	0.728	0.867	1.412	1.781	2.470	2.470	0.735	0.492
90204	CALGARY	49	0.095	0.334	0.476	0.699	0.800	0.851	0.948	1.261	1.752	2.881	2.881	0.760	0.479
00118	VANCOUVER	38	0.345	0.653	0.763	1.023	1.179	1.338	1.497	1.782	2.002	2.519	2.519	1.134	0.479
00111	VANCOUVER	68	0.339	0.558	0.746	1.159	1.310	1.448	1.610	1.716	1.941	2.602	2.602	1.151	0.504
00303	VICTORIA	54	0.088	0.427	0.631	0.834	0.989	1.019	1.228	1.473	1.665	2.142	2.142	0.889	0.409
60204	WINDSOR	67	0.291	0.641	1.432	2.060	2.443	2.947	4.020	5.208	6.472	9.710	9.710	2.627	2.015
61901	WALPOLE ISLAND	23	ND	0.323	1.048	1.329	1.675	1.919	2.279	4.920	5.228	9.175	9.175	1.991	2.091

Table B8 : Frequency Distribution of Chlorine (Cl) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution	Min.	10	30	50	60	70	80	90	95	99	Max.	Mean	Std.Dev.
30101	HALIFAX	50	0.076	0.161	0.321	0.513	0.594	0.757	1.015	1.503	1.629	2.857	2.857	0.666	0.565	
50104	MONTREAL	56	ND	0.060	0.099	0.173	0.258	0.413	1.020	1.532	2.951	3.798	3.798	0.554	0.833	
50109	MONTREAL	40	ND	0.128	0.179	0.300	0.364	0.445	1.457	3.463	5.596	9.380	9.380	0.986	1.800	
50307	QUEBEC CITY	53	0.003	0.049	0.120	0.223	0.304	0.491	0.741	1.101	1.824	4.811	4.811	0.484	0.758	
60104	OTTAWA	47	ND	0.030	0.057	0.073	0.091	0.252	0.346	0.533	1.847	3.619	3.619	0.301	0.636	
60417	TORONTO	41	0.005	0.051	0.112	0.132	0.158	0.178	0.471	0.784	1.350	1.530	1.530	0.299	0.401	
70119	WINNIPEG	40	ND	0.019	0.046	0.081	0.101	0.153	0.251	0.634	1.036	1.096	1.096	0.174	0.259	
90130	EDMONTON	34	0.015	0.041	0.077	0.117	0.170	0.213	0.338	0.705	1.351	1.898	1.898	0.289	0.427	
90204	CALGARY	49	0.009	0.035	0.072	0.116	0.218	0.541	1.057	2.062	2.910	4.798	4.798	0.606	0.987	
00118	VANCOUVER	38	0.089	0.147	0.249	0.459	0.521	0.687	1.033	1.437	3.090	3.290	3.290	0.697	0.758	
00111	VANCOUVER	68	0.043	0.122	0.205	0.290	0.365	0.444	0.521	0.641	0.785	1.456	1.456	0.363	0.258	
00303	VICTORIA	54	ND	0.160	0.332	0.583	0.715	0.904	1.269	1.476	1.523	1.874	1.874	0.706	0.500	
60204	WINDSOR	67	ND	0.009	0.071	0.195	0.258	0.301	0.458	0.962	1.343	1.775	1.775	0.330	0.428	
61901	WALPOLE ISLAND	23	ND	0.008	0.017	0.025	0.030	0.040	0.047	0.054	0.068	0.249	0.249	0.037	0.049	

Table B9 : Frequency Distribution of Potassium (K) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.028	0.041	0.068	0.091	0.112	0.132	0.172	0.205	0.219	0.358	0.358	0.111	0.066
50104	MONTREAL	56	0.025	0.097	0.141	0.189	0.198	0.214	0.238	0.334	0.382	0.586	0.586	0.197	0.098
50109	MONTREAL	40	ND	0.156	0.211	0.284	0.344	0.364	0.410	0.433	0.522	0.734	0.734	0.289	0.139
50307	QUEBEC CITY	53	0.026	0.063	0.086	0.135	0.157	0.193	0.235	0.269	0.326	0.806	0.806	0.163	0.128
60104	OTTAWA	47	0.019	0.065	0.093	0.129	0.136	0.155	0.183	0.259	0.291	0.669	0.669	0.150	0.114
60417	TORONTO	41	0.024	0.066	0.093	0.131	0.146	0.160	0.176	0.217	0.291	0.682	0.682	0.148	0.108
70119	WINNIPEG	40	0.014	0.061	0.104	0.167	0.190	0.214	0.240	0.302	0.424	0.539	0.539	0.171	0.109
90130	EDMONTON	34	0.039	0.071	0.142	0.189	0.202	0.228	0.270	0.348	0.373	0.493	0.493	0.191	0.102
90204	CALGARY	49	0.039	0.068	0.121	0.175	0.194	0.221	0.240	0.256	0.303	0.570	0.570	0.178	0.091
00118	VANCOUVER	38	0.091	0.105	0.138	0.156	0.175	0.200	0.231	0.352	0.468	0.478	0.478	0.189	0.094
00111	VANCOUVER	68	0.045	0.063	0.095	0.130	0.142	0.154	0.170	0.198	0.225	0.240	0.240	0.128	0.050
00303	VICTORIA	54	0.020	0.044	0.062	0.091	0.116	0.126	0.144	0.209	0.243	0.262	0.262	0.105	0.062
60204	WINDSOR	67	0.037	0.077	0.142	0.195	0.229	0.293	0.334	0.445	0.742	0.910	0.910	0.246	0.194
61901	WALPOLE ISLAND	23	ND	0.020	0.078	0.119	0.149	0.197	0.245	0.263	0.367	0.645	0.645	0.157	0.139

Table B10 : Frequency Distribution of Calcium (Ca) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.019	0.044	0.079	0.110	0.136	0.151	0.193	0.271	0.367	0.519	0.519	0.136	0.104
50104	MONTREAL	56	0.164	0.342	0.616	1.017	1.224	1.482	1.550	1.884	2.809	4.583	4.583	1.135	0.794
50109	MONTREAL	40	ND	0.554	1.411	1.619	1.918	2.145	2.386	3.088	3.738	4.113	4.113	1.707	0.941
50307	QUEBEC CITY	53	0.035	0.118	0.277	0.569	0.693	0.853	1.133	1.630	2.577	4.118	4.118	0.772	0.787
60104	OTTAWA	47	0.028	0.152	0.376	0.672	0.854	0.904	1.217	1.505	1.671	2.741	2.741	0.755	0.587
60417	TORONTO	41	0.040	0.224	0.536	0.863	0.953	1.201	1.490	1.645	2.280	3.409	3.409	0.962	0.702
70119	WINNIPEG	40	0.017	0.407	0.687	1.292	1.632	2.099	2.483	3.338	5.730	7.577	7.577	1.659	1.566
90130	EDMONTON	34	0.111	0.201	0.411	0.540	0.650	0.738	0.923	1.124	1.348	1.673	1.673	0.631	0.358
90204	CALGARY	49	0.146	0.505	0.808	1.485	1.637	1.813	2.120	2.763	3.939	4.329	4.329	1.518	0.967
00118	VANCOUVER	38	0.040	0.102	0.127	0.221	0.262	0.298	0.350	0.458	1.148	1.250	1.250	0.280	0.253
00111	VANCOUVER	68	0.013	0.052	0.147	0.195	0.251	0.310	0.389	0.473	0.530	0.684	0.684	0.241	0.160
00303	VICTORIA	54	0.010	0.051	0.083	0.116	0.129	0.148	0.168	0.192	0.259	0.405	0.405	0.123	0.069
60204	WINDSOR	67	0.180	0.373	0.653	0.989	1.068	1.301	1.490	2.112	2.197	3.265	3.265	1.084	0.659
61901	WALPOLE ISLAND	23	0.009	0.103	0.206	0.380	0.416	0.696	1.019	1.182	1.197	1.596	1.596	0.519	0.430

Table B11 : Frequency Distribution of Scandium (Sc) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution	Min.	10	30	50	60	70	80	90	95	99	Max.	Mean	Std.Dev.
30101	HALIFAX	50	ND	ND	0.003	0.003	0.004	0.005	0.006	0.006	0.008	0.008	0.008	0.002	0.002	
50104	MONTREAL	56	ND	0.006	0.010	0.012	0.013	0.015	0.023	0.031	0.048	0.048	0.048	0.011	0.009	
50109	MONTREAL	40	ND	0.010	0.017	0.021	0.025	0.027	0.030	0.032	0.032	0.032	0.032	0.017	0.010	
50307	QUEBEC CITY	53	ND	0.004	0.006	0.009	0.010	0.012	0.016	0.024	0.044	0.044	0.044	0.008	0.008	
60104	OTTAWA	47	ND	0.003	0.007	0.010	0.011	0.012	0.020	0.020	0.029	0.029	0.029	0.007	0.007	
60417	TORONTO	41	ND	0.007	0.011	0.011	0.014	0.017	0.029	0.032	0.035	0.035	0.035	0.012	0.010	
70119	WINNIPEG	40	ND	0.008	0.010	0.015	0.021	0.024	0.031	0.047	0.059	0.059	0.059	0.014	0.013	
90130	EDMONTON	34	ND	0.004	0.008	0.009	0.010	0.013	0.015	0.017	0.021	0.021	0.021	0.008	0.006	
90204	CALGARY	49	ND	0.006	0.009	0.012	0.018	0.020	0.025	0.028	0.048	0.068	0.068	0.017	0.014	
00118	VANCOUVER	38	ND	ND	0.003	0.003	0.004	0.005	0.008	0.008	0.010	0.010	0.010	0.003	0.003	
00111	VANCOUVER	68	ND	ND	0.005	0.007	0.008	0.011	0.013	0.017	0.025	0.025	0.025	0.006	0.006	
00303	VICTORIA	54	ND	ND	0.003	0.004	0.005	0.007	0.009	0.010	0.010	0.010	0.010	0.003	0.003	
60204	WINDSOR	67	ND	0.006	0.011	0.016	0.024	0.032	0.036	0.054	0.054	0.054	0.054	0.014	0.012	
61901	WALPOLE ISLAND	23	ND	0.003	0.011	0.012	0.015	0.017	0.022	0.024	0.024	0.024	0.024	0.009 ^c	0.007	

Table B12 : Frequency Distribution of Titanium (Ti) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution Min. 10 30 50 60 70 80 90 95 99	Mean	Std.Dev.
30101	HALIFAX	50	ND 0.007 0.013 0.021 0.026 0.030 0.041 0.050 0.057 0.100	0.100	0.025
50104	MONTREAL	56	ND 0.012 0.028 0.041 0.048 0.059 0.064 0.112 0.161 0.182	0.182	0.052
50109	MONTREAL	40	0.014 0.027 0.058 0.074 0.082 0.091 0.123 0.134 0.175 0.211	0.211	0.043
50307	QUEBEC CITY	53	ND 0.006 0.016 0.025 0.030 0.039 0.053 0.060 0.087 0.152	0.152	0.032
60104	OTTAWA	47	ND 0.011 0.019 0.026 0.029 0.037 0.044 0.047 0.166	0.166	0.026
60417	TORONTO	41	ND 0.007 0.017 0.026 0.032 0.035 0.042 0.077 0.094 0.234	0.234	0.036
70119	WINNIPEG	40	ND 0.007 0.017 0.028 0.031 0.043 0.049 0.065 0.074 0.098	0.098	0.031
90130	EDMONTON	34	0.013 0.020 0.042 0.057 0.063 0.069 0.077 0.109 0.142	0.145	0.058
90204	CALGARY	49	0.006 0.014 0.029 0.044 0.047 0.057 0.061 0.067 0.074	0.095	0.042
00118	VANCOUVER	38	0.005 0.009 0.016 0.026 0.031 0.041 0.049 0.058 0.080	0.087	0.030
00111	VANCOUVER	68	ND 0.008 0.027 0.049 0.058 0.062 0.089 0.142	0.148	0.257
00303	VICTORIA	54	ND 0.005 0.016 0.021 0.025 0.026 0.031 0.041	0.048	0.064
60204	WINDSOR	67	ND 0.013 0.019 0.034 0.039 0.047 0.052 0.079	0.174	0.022
61901	WALPOLE ISLAND	23	ND 0.008 0.016 0.018 0.027 0.035 0.065	0.083	0.039
				0.101	0.024

Table B13 : Frequency Distribution of Vanadium (V) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution												Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.			
30101	HALIFAX	50	0.006	0.051	0.087	0.111	0.139	0.160	0.172	0.242	0.266	0.477	0.477	0.130	0.092	
50104	MONTREAL	56	ND	ND	0.010	0.014	0.017	0.018	0.022	0.027	0.031	0.048	0.048	0.015	0.010	
50109	MONTREAL	40	ND	0.010	0.016	0.019	0.020	0.022	0.024	0.045	0.051	0.072	0.072	0.021	0.013	
50307	QUEBEC CITY	53	ND	ND	0.006	0.011	0.013	0.015	0.022	0.028	0.036	0.040	0.040	0.013	0.011	
60104	OTTAWA	47	ND	ND	0.004	0.005	0.010	0.012	0.014	0.018	0.020	0.035	0.035	0.008	0.008	
60417	TORONTO	41	ND	ND	ND	0.004	0.004	0.010	0.013	0.017	0.021	0.033	0.033	0.006	0.008	
70119	WINNIPEG	39	ND	ND	ND	0.004	0.005	0.007	0.011	0.014	0.015	0.016	0.016	0.005	0.005	
90130	EDMONTON	34	ND	ND	0.006	0.009	0.011	0.015	0.016	0.020	0.023	0.027	0.027	0.010	0.007	
90204	CALGARY	49	ND	ND	0.005	0.008	0.010	0.013	0.014	0.019	0.019	0.021	0.021	0.009	0.006	
00118	VANCOUVER	38	ND	0.004	0.007	0.012	0.014	0.017	0.019	0.022	0.025	0.028	0.028	0.012	0.007	
00111	VANCOUVER	68	ND	ND	0.005	0.013	0.015	0.017	0.018	0.019	0.024	0.031	0.031	0.011	0.008	
00303	VICTORIA	54	ND	ND	0.008	0.013	0.015	0.017	0.019	0.023	0.026	0.038	0.038	0.013	0.008	
60204	WINDSOR	67	ND	ND	ND	0.005	0.007	0.008	0.014	0.025	0.027	0.031	0.031	0.007	0.009	
61901	WALPOLE ISLAND	23	ND	ND	ND	ND	ND	ND	ND	0.005	0.010	0.013	0.013	0.002	0.004	

Table B14 : Frequency Distribution of Chromium (Cr) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	ND	ND	0.004	0.007	0.011	0.012	0.014	0.015	0.017	0.028	0.028	0.008	0.006
50104	MONTREAL	56	ND	ND	0.004	0.010	0.011	0.014	0.016	0.018	0.020	0.038	0.038	0.010	0.007
50109	MONTREAL	40	ND	0.009	0.011	0.014	0.015	0.017	0.018	0.023	0.024	0.030	0.030	0.014	0.006
50307	QUEBEC CITY	53	ND	ND	ND	0.004	0.006	0.008	0.009	0.014	0.016	0.021	0.021	0.005	0.005
60104	OTTAWA	47	ND	ND	ND	0.004	0.008	0.010	0.012	0.013	0.013	0.014	0.014	0.005	0.005
60417	TORONTO	41	ND	ND	0.004	0.005	0.005	0.009	0.012	0.016	0.018	0.027	0.027	0.007	0.007
70119	WINNIPEG	40	ND	ND	0.004	0.004	0.005	0.007	0.010	0.013	0.013	0.014	0.014	0.005	0.004
90130	EDMONTON	34	0.004	0.007	0.011	0.014	0.014	0.016	0.017	0.019	0.024	0.029	0.029	0.013	0.005
90204	CALGARY	49	ND	ND	0.005	0.009	0.011	0.012	0.013	0.016	0.017	0.018	0.018	0.009	0.005
00118	VANCOUVER	38	ND	ND	0.003	0.005	0.008	0.010	0.012	0.015	0.018	0.020	0.020	0.007	0.006
00111	VANCOUVER	68	ND	0.003	0.006	0.011	0.013	0.015	0.017	0.020	0.022	0.070	0.070	0.012	0.010
00303	VICTORIA	54	ND	ND	ND	0.004	0.007	0.009	0.011	0.012	0.014	0.016	0.016	0.005	0.005
60204	WINDSOR	67	ND	ND	ND	0.005	0.008	0.010	0.013	0.016	0.020	0.029	0.029	0.007	0.007
61901	WALPOLE ISLAND	23	ND	ND	ND	ND	ND	ND	ND	0.003	0.004	0.006	0.006	0.001	0.002

Table B15 : Frequency Distribution of Manganese (Mn) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution												Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.			
30101	HALIFAX	50	0.004	0.008	0.013	0.015	0.017	0.018	0.022	0.024	0.027	0.053	0.053	0.016	0.008	
50104	MONTREAL	56	0.008	0.023	0.034	0.040	0.043	0.052	0.068	0.113	0.144	0.199	0.199	0.053	0.038	
50109	MONTREAL	40	0.019	0.029	0.056	0.069	0.073	0.098	0.112	0.136	0.185	0.371	0.371	0.083	0.061	
50307	QUEBEC CITY	53	0.006	0.008	0.014	0.021	0.024	0.029	0.035	0.040	0.052	0.076	0.076	0.024	0.015	
60104	OTTAWA	47	0.004	0.011	0.015	0.018	0.022	0.024	0.033	0.043	0.064	0.068	0.068	0.023	0.015	
60417	TORONTO	41	0.005	0.013	0.020	0.024	0.027	0.030	0.036	0.046	0.053	0.091	0.091	0.028	0.016	
70119	WINNIPEG	40	ND	0.009	0.012	0.015	0.017	0.021	0.026	0.031	0.033	0.039	0.039	0.017	0.009	
90130	EDMONTON	34	0.011	0.016	0.023	0.029	0.032	0.038	0.042	0.055	0.059	0.067	0.067	0.031	0.014	
90204	CALGARY	49	0.004	0.012	0.019	0.026	0.028	0.029	0.033	0.041	0.043	0.053	0.053	0.025	0.011	
00118	VANCOUVER	38	0.013	0.014	0.024	0.027	0.029	0.041	0.056	0.062	0.078	0.097	0.097	0.035	0.020	
00111	VANCOUVER	68	0.005	0.012	0.018	0.025	0.027	0.032	0.043	0.069	0.070	0.113	0.113	0.031	0.022	
00303	VICTORIA	54	ND	0.010	0.013	0.019	0.019	0.021	0.028	0.036	0.042	0.056	0.056	0.020	0.011	
60204	WINDSOR	67	0.004	0.013	0.017	0.026	0.034	0.039	0.051	0.066	0.074	0.114	0.114	0.033	0.022	
61901	WALPOLE ISLAND	23	ND	ND	0.004	0.009	0.010	0.012	0.014	0.017	0.027	0.035	0.035	0.010	0.008	

Table B16 : Frequency Distribution of Iron (Fe) Concentrations ($\mu\text{g}/\text{m}^3$)

Station Number	City	No. of Samples	Frequency Distribution											Mean	Std.Dev.
			Min.	10	30	50	60	70	80	90	95	99	Max.		
30101	HALIFAX	50	0.048	0.065	0.146	0.213	0.244	0.283	0.338	0.418	0.506	2.486	2.486	0.266	0.343
50104	MONTREAL	56	0.072	0.146	0.262	0.362	0.380	0.436	0.557	0.841	1.060	1.591	1.591	0.430	0.318
50109	MONTREAL	40	0.195	0.286	0.610	0.786	0.808	0.901	1.034	1.353	1.391	1.747	1.747	0.778	0.357
50307	QUEBEC CITY	53	0.025	0.084	0.132	0.203	0.244	0.323	0.435	0.621	0.771	1.275	1.275	0.285	0.255
60104	OTTAWA	47	0.040	0.078	0.140	0.195	0.223	0.253	0.304	0.364	0.461	1.544	1.544	0.229	0.222
60417	TORONTO	41	0.027	0.150	0.254	0.339	0.395	0.442	0.529	0.741	1.048	2.197	2.197	0.429	0.370
70119	WINNIPEG	40	0.033	0.120	0.194	0.263	0.336	0.437	0.507	0.626	0.811	1.021	1.021	0.326	0.217
90130	EDMONTON	34	0.155	0.228	0.457	0.647	0.730	0.779	0.994	1.162	1.378	1.590	1.590	0.684	0.364
90204	CALGARY	49	0.074	0.197	0.304	0.543	0.576	0.626	0.678	0.726	0.939	1.009	1.009	0.487	0.226
00118	VANCOUVER	38	0.084	0.115	0.168	0.235	0.264	0.399	0.445	0.623	0.769	0.909	0.909	0.313	0.206
00111	VANCOUVER	68	0.060	0.130	0.299	0.429	0.508	0.590	0.676	0.759	0.839	0.927	0.927	0.445	0.232
00303	VICTORIA	54	0.046	0.070	0.117	0.170	0.184	0.194	0.269	0.325	0.356	0.475	0.475	0.179	0.099
60204	WINDSOR	67	0.104	0.205	0.343	0.518	0.662	0.932	1.173	1.650	1.870	2.477	2.477	0.729	0.563
61901	WALPOLE ISLAND	23	0.003	0.038	0.093	0.174	0.204	0.290	0.311	0.466	0.649	0.915	0.915	0.232	0.217